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## The Austrian Gold Mill.

THE construction of the Austrian Gold "Mill" is seen in the following figure, which represents that form of the apparatus in which the motive power is communicated from below. This gives the most convenient method of adjusting the height of the runner *l* above the mercury. To obtain this advantage the spindle on which this runner is carried, is passed through the mill.

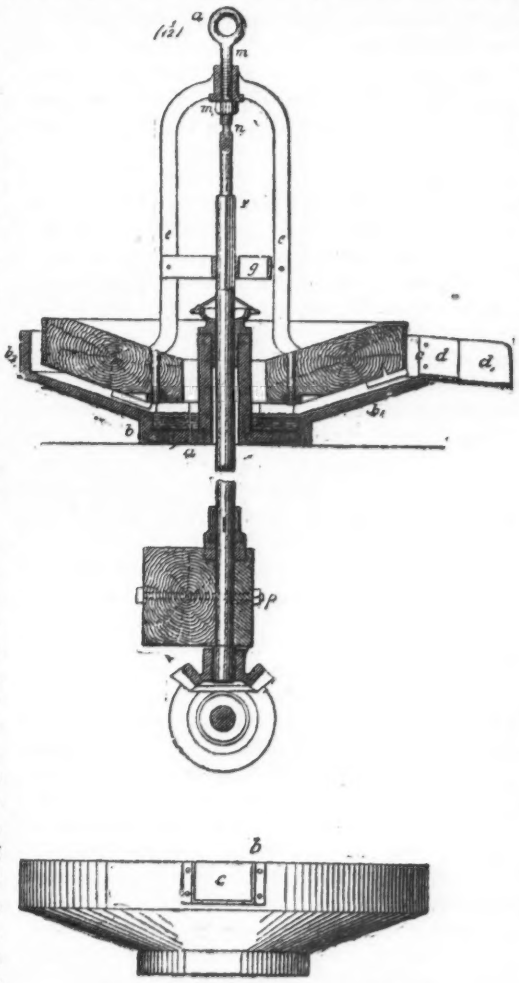
In this figure *a* is the pan, *l* the runner, *e* the arms, three in number, by which the runner is fastened to the spindle, *s* is a brace which both stiffens the arms *e*, and also transmits the movement of the spindle to the arms. The spindle is made square at this point, and the aperture in the brace being also square, the brace, arms and runner are carried round by the revolution of the spindle. Discharge takes place at c, a spout of sheet iron *d* being rivetted to the cast-iron pan. The adjusting apparatus consists of the thumb-screw *m*. It is to be remarked that the spindle ends at *n*, the end being hollowed out to receive the end of the thumb-screw. This screw works in a thread, cut to receive it, in the top of the arms *e*. The spindle itself rests on the beam *p*, and cannot move up or down. When the thumb-screw *m* is turned, its bearing on the top of the spindle remains constant, but the arms and consequently the runner are raised or lowered.

The pan is made of cast-iron, and as it suffers little wear can be made very light. The drums, which, being three in number, form a tripod, are made of light bar iron, of about 1½ inches in width, and ¼ inch in thickness. The runner is of wood, having the shape of the mill, and hollowed out on top so as to form a hopper. It is bolted to the tripod, bound with ordinary hoop iron, and on the bottom has a number of short pieces of sheet-iron, driven in. These "wings" are from 2½ to 3 inches long and ¾ inch wide, and act like the vanes in a fan blower, or rotary pump ; that is, they force the pulp to partake of the rotary motion and drive it out of the machine. Twenty to thirty wings are placed radially in each runner, in such a manner as to break joints, from the center to the circumference. Those which work over the slanting part of the pan are made only one-half inch wide, in order to allow the wings placed over the mercury, freedom of motion.

Pans are usually wider at the bottom than the figure represents. In this pan the interior of the bottom, where the mercury is placed, is only 9 inches in diameter. Usually 15 inches is the width, and as the center is taken up by the aperture through which the spindle passes, the real width of the annular space, filled with mercury, is in this pan only 3 inches, and in the ordinary pan 6½ inches.

When pulp is poured into the runner, it passes through the center opening, down to the mercury, where the action of the wings gives it a rotary motion, and at the same time carries it toward the circumference. These wings should revolve just above the mercury, but not in contact with it. By this means, every particle of the pulp passes part or all the way round the pan before it is discharged, and its path over the mercury is therefore longer. It does this with the least possible turbulence, and the gold particles have opportunity to reach the mercury, where, sinking in that fluid, they are safe from liability to be carried off on the stream.

Successful work depends upon the thickness of the pulp and the speed given the runner, and one



*THE AUSTRIAN GOLD MIL L.*

of the advantages of this mill is the readiness with which its work can be altered to suit any kind or condition of ore.

*Condition of the Pulp.*—This depends upon two things, density and fineness. A concentrated ore has a much higher specific gravity than undressed ore, because the lighter minerals, quartz, etc., have been removed. The difference between its gravity and that of gold is therefore less, and we must take care, 1st to have the slime so thin that the gold particles will have easy movement through it; and 2nd that the motion of the runner shall be fast enough to keep the heavy material which it has to carry along, from settling on the surface of the mercury. Experience has proved that with undressed ore containing not more than 10 per cent. of heavy mineral (pyrites, etc.) to 90 per cent. of gangue, the runner should make from 12 to 15 revolutions per minute ; from one half to one cubic foot of pulp may be passed every minute ; and finally this pulp must be of such a thickness that not more than 125 pounds of ore shall pass through the mill in one hour.

When the ore has been concentrated the conditions are quite different. The runner is revolved at the rate of 20 to 30 times a minute, and the pulp must be thinned so that not more than 13 to 15 pounds of ore pass through the mill hourly. The amount of pulp however must be kept up to a half or one cubic foot a minute.

If the pulp is too coarse it hangs back in the mill and chokes it, if it is too fine the gold does not settle. *Good* stamp work answers well. It is not well to suffer pulp to dry and then wet it to run through the mill. Experience proves that the extraction is not so good under such circumstances, probably because the particles of gold have air adhering to them which lessens their gravity.

Two or three mills are usually placed one after the other. With these, of the whole amount of gold extracted from a pulp rich in galena and therefore not favourable to amalgamation,

| | |
|---|---|
| The first extracted | 65 per cent. |
| The second | 25 ,, |
| The third | 10 ,, |

With a sandy pulp which contained little heavy mineral the result was :

| | |
|---|---|
| The first extracted | 74 per cent. |
| The second | 20 ,, |
| The third | 6 ,, |

One mill, or one set of 2 or 3 mills, will pass from 2,250 to 3,000 pounds of undressed pulp in 24 hours. Of dressed ore it will pass through about as much as would correspond to that quantity of unconcentrated pulp. When the ore contains 10 per cent. of heavy minerals there is no gain in previous concentration, while the extraction is better with undressed pulp.

In this apparatus loss of mercury is reduced to a minimum. With two rows of pans the loss for 100,000 pounds of

| | |
|---|---|
| pulp rich in heavy mineral was | 1·5 to 2 pounds |
| " poor " " " | 1 to 1·5 pounds |

In the first case it was therefore about one-half ounce to one ton ; in the second one-third ounce. Clayey ores and those containing antimony increase this loss.

The yield can be increased by concentrating the amalgamated pulp, and repassing the tailings under the conditions necessary in working concentrated pulp. By this means from 20 to 30 per cent of the mercury is recovered, while about the same amount of the amalgamable gold is also won. The first operation extracts about 70 per cent.

The power necessary to run one mill is about *one twenty-fifth* of a horse power. A twelve pan apparatus costs in Austria about $250.

Rittinger has calculated the cost and yield of three modes of treating gold ores.

A. Concentration on blankets, further concentration of the blanket slime on a sleeping-table, and finally panning out the gold by hand. With easy working pulp this method yields the same as B ;

with pulp hard to work, the yield is better than by any other method.

B. Treatment in gold mills. With good ores this method gives the same yield as A; with ores difficult to work, the yield is only 85 to 90 per cent. of that of A.

C. By union of A and B; by first passing the pulp through mills and then treating with blankets, sleeping-tables and panning out.

Calling C 100, both in cost and yield, the others are relatively as follows:

| | Cost. | Yield. good ores. | difficult ores. |
|---|---|---|---|
| C..... | 100 | 100 | 100 |
| B..... | 44·46 | 65—80 | 55—70 |
| A..... | 65·25 | 65—80 | 65—80 |

The work on blankets, with panning by hand, therefore, costs in Austria one-half more than simple milling; and the two methods together cost a little more than twice as much as milling alone.

## Notes on the Wet Extraction of Copper from Pyrites.

BY ALEXANDER TRIPPEL, METALLURGIST.

The gradually-increasing necessity of employing cheaper methods for extracting copper from the poorer ores, has called up again the question of wet extraction in preference to smelting. In fact, the progress made in treating the ores of nickel, cobalt, copper and silver by hydrometallurgical operations is such that they bid fair to supersede even the best-known smelting processes.

The humid extraction of copper from its ores is not new, but has been in use in Europe in several localities for a long period, and in some instances with success. Yet, in this country, where labor and most materials are high, and the expectations of profit and quick returns still higher, most, if not all these long-known methods would prove unsatisfactory in their practical results.

The object of all the different methods of humid extraction is uniform in so far as it is intended to transform the copper into a soluble salt, from which it is precipitated either in a metallic state, as oxide, or even as a sulphide.

The entire and easy solution of the copper, with the least possible solution of iron, by the liquid, and the equally prompt precipitation, is a matter of scientific or technical research; to do this with the least expense, and to choose a method adapted to the material on hand and a given locality, is the more practical and economic question. There is probably no metallurgical process in existence which could strictly be called universal; nearly every location has its peculiar circumstances, which will necessitate discretion in the choice of a method, although this point, so important for metallurgical operations, is often overlooked, whereby frequent cause for failure is given.

Sulphides, such as copper and iron pyrites, combined with smaller quantities of the sulphides of nickel, cobalt, silver, and lead, are, by roasting, more or less converted first into soluble sulphates, and afterwards, with increased heat, into insoluble oxides. The temperature required for the decomposition of the sulphates into oxides is specific for every metal, commencing with the sulphate of iron, and increasing for the sulphates of nickel, copper and silver respectively. It is therefore theoretically possible, by controlling the temperature, to keep some metals in a soluble condition, while others are rendered insoluble. These facts have been ingeniously used, for instance, for the extraction of silver from argentiferous copper ores where, by a skillful roasting, all the silver is obtained in a soluble state, while iron and copper are oxidized and made insoluble.

This apparently simple method has, however, not been found practicable for the extraction of copper, on account of several grave obstacles in the way, making the whole operation incomplete and unsatisfactory. More successful were the methods with the assistance of either sulphuric or chlorhydric acid. The use of acids is limited, but it will be found advantageous for carbonates or oxides of copper, and where the gangue consists chiefly of quartzose rocks. In countries where chlorhydric acid is exceedingly cheap, its application may be indicated to some extent for even pyritous copper ores; but as a rule, acids are objectionable, and now hardly employed on a large scale. Not only is a great part of the acid uselessly consumed by the oxide of iron—possibly by the lime in the gangue—but basic salts are formed in many cases, which mingle with the copper, and are otherwise very unwelcome.

In addition to these defects, in all such cases, the copper is brought into a state which requires considerable more iron for its precipitation than in some other processes, more recently adopted, and it is therefore by no means economical.

The most successful methods for extracting copper from pyritous ores are those where chloride of sodium (common salt) or sulphate of sodium (called salt-cake) are employed.

The raw ore, being finely crushed, is roasted in furnaces with an addition of one of these salts, or they are mixed with the ore after roasting. The action of these chemicals is either a direct one, as in the case of MONNIER'S process, where sulphate of soda is used, or they are intended to form combinations with the oxides of iron, so as to change them into per- or protochlorides, which are to dissolve the oxides of copper—as, for instance, in the process of HUNT & DOUGLAS.

With the present state of chemical knowledge, it is hardly probable that any other chemicals than those mentioned will be applied, as none other are sufficiently cheap to be used economically in these operations. It will be therefore of interest to examine both "MONNIER'S" and the "HUNT & DOUGLAS" process, as the representatives of two different systems.

The former process was first introduced some twelve years ago by Mr. ALFRED MONNIER, and is now in successful practice for the extraction of copper from poor pyrites, combined with the manufacture of sulphuric acid. It is based upon the fact, that sulphate of soda, mixed with the pyritiferous ore, assists greatly in forming sulphate of copper, to the exclusion of sulphate of iron, in the following manner:

When the oxidizing hot gases of the furnace commence to desulphurize the pyrites, sulphuric and sulphurous acids are formed, and while the latter escapes, much of the former is taken up by the sulphate of soda, producing a *bi-sulphate*. Popularly speaking, the acid is stored up in the bi-sulphate of soda for further use, at the right moment. Another part of the acid combines with the oxides of iron and copper to sulphates, of which, at a higher temperature, nearly all the former and some of the latter is decomposed. But the second equivalent of the acid in the soda now becomes free too, and combining with the oxides, brings them back into sulphates. Thus, by maintaining a proper temperature in the furnace, the sulphate of iron becomes gradually decomposed, while the sulphate of copper is kept intact, soluble, and therefore fit for lixiviation. It is very probable, that the formation of a double salt of copper and soda assists in keeping the copper in a soluble condition.

This is a short explanation of the action of the soda-sulphate in the furnace. The roasting in this case requires but a moderate heat, and exceedingly little fuel is necessary; in fact, when the ore is rich in sulphur, the amount of fuel is hardly more than nominal. The roasted mass is now lixiviated, which operation is facilitated, by the condition of the roasted ore, allowing an easy percolation of the liquid. By a properly arranged system of tanks, in which the brine is moved by displacement from one into another, the liquor obtained has a sufficient concentration to allow the crystallisation in flat basins of nearly four-fifths of the soda it contains. This part of the operation takes several days, when the mother-liquor, containing all the copper, some iron and the balance of the soda, is drawn off and evaporated to 40° Beaumé. This concentrated brine is again crystallized, and furnishes the salts of copper and soda, including some iron, in a granulated state. The resulting mother-liquor is taken back to the former operations. I may mention here, that the evaporation of the liquor is done very ingeniously and cheaply by using a current of hot air.

The next part is the reduction of the metallic sulphates. The salts are first dried on the arch of the calcining furnace, then mixed with charcoal and heated gradually to redness in a special furnace, when they decompose and form protoxides, mixed with metallic copper, both of which can easily be separated by washing from the remaining charcoal, while the soda, yet in the mixture, becomes dissolved and goes back to the lixiviating tanks.

The precipitated copper has almost the exact appearance and richness of cement precipitated by metallic iron, and undergoes the same refining process as the latter.

This simple, cheap and effectual method of precipitating the copper without the use of metallic iron, is a very important feature in MONNIER'S process, and especially so, because, in most cases, the iron can be had at or near the copper-mines at a cost only slightly advanced.

The actual consumption of soda is but trifling, if the operations are well conducted; it does not exceed one per cent. for each operation, and as its cost is very low, the expense caused by its loss is almost nominal. The efficiency of this process with regard to the actual recovery of the copper in the ore, has been well tested, and from average returns for a long period, it was found that pyrites, yielding 85 pounds of copper per ton, have actually returned 82½ pounds—a loss of only 3 per cent. of the copper.

TO BE CONTINUED.

## Mint Processes in England.

Mr. CHANDLER ROBERTS, assayer to the British Mint, has introduced a valuable method of toughening gold by the action of chlorine on melted "brittle" gold. He says;

"In my preliminary reports upon the method of toughening brittle gold, in 1869 and 1870 respectively, I detailed the experiments which enabled me to recommend that chlorine gas should be employed for rendering ductile gold of which the intractable character had escaped detection when the ingots were imported into the Mint.

"The amount of gold set aside as unfit for working during the coinage of £6,500,000, which was completed in July, 1871, amounted to 40,000 ozs., and I now proceed to describe the method by which this gold was treated; but as the details are necessarily technical, it may be well to repeat that brittleness in gold is usually due to the presence of minute traces of foreign metals, and that these metallic impurities are eliminated as chlorides by the passage of chlorine gas through the molten metal.

"In the melting of gold, as ordinarily practised in the Mint, crucibles of graphite are employed, but such crucibles are not well adapted for use in the treatment of gold by chlorine gas, as the gases evolved from them exercise a reducing action upon the chlorides. It is therefore advisable to substitute crucibles of fire-clay for those of graphite, but, as the workmen of the Mint are unaccustomed to the manipulation of fire-clay crucibles, I was obliged to avail myself of the crucibles ordinarily in use, with the slight inconvenience entailed by the necessity of prolonging by some minutes the time during which the gold is exposed to the action of the chlorine.

"About 1100 ozs. of gold were melted in each crucible, and the chlorine gas was passed through each in succession, the time during which the metal was exposed to the gas varying from 5 to 7 minutes. The gold was found to be perfectly tough, and was re-assayed and again melted with the amount of copper required to form standard gold.

"I append a statement indicating the result of the operations upon 40,000 ozs. of standard gold.

| | Ozs. | Ozs. |
|---|---|---|
| Amount of initial loss..... | | 40·360 |

| | | |
|---|---|---|
| Amount of gold recovered from ground-up crucibles, borax, &c | 15·507 | |
| Amount of copper and base metal proved by assay to have been eliminated as chloride. | 24·746 | |
| | | 40·253 |
| Loss..... | | 0·107 |

It will be seen that the loss of gold on toughening 40,000 ozs. was only 1-10th of an ounce, and I submit that the experience gained by operating upon an extended scale has fully justified the opinion which I formed from preliminary experiments, and that the process may now be considered to have fairly taken its place as an operation of minting."

The result of these carefully conducted processes is that when during the last trial the jury selected coins, assaying portions of metal from every part of the coin, their verdict was in the highest degree satisfactory, notwithstanding the increased stringency of the examination.

It is interesting as indicating the accuracy attained in the preparation of the gold-copper alloy, that analysis of the assay reports on 1,000,000 of gold coin issued in the ordinary course between the 2d and 18th of November, 1871, shows that :—

| | | Per mille of Gold. |
|---|---|---|
| 1·33 | per cent of the coins contained | 916·2 |
| 6·00 | " " " | 916·3 |
| 6·66 | " " " | 916·4 |
| 16·66 | " " " | 916·5 |
| 15·33 | " " " | 916·6 |
| 27·33 | were of the exact standard. | 916·666 |
| 13·33 | " " " | 916·7 |
| 9·33 | " " " | 916.8 |
| 2·66 | " " " | 916·9 |
| 1·35 | " " " | 916·0 |
| 99·99 | | |
| Mean composition of the coins | | 916·61 gold. 83·39 copper. |
| | | 1000·00 |

The limits of the "remedy" permitted by law being 914·6 and 918·6 parts in 1000.

These results are not only good, they are remarkable ; for according to ordinary methods of chemical analysis, the deviation from the standard would only amount to a variation of 0·2 per cent., fully in agreement with the remarks of M. DE JACOBI, who represented the Russian Government at the International Monetary Conference held in Paris in June 1867, and who said, "the tolerance is not an arbitrary stipulation, but is the limit of errors which belongs to every thought, to every chemical analysis, to every composition of alloy, and, as such, depends on the precision of the balances, and the methods employed in the fabrication of money ; it may be determined rigorously by applying the calculus of probabilities."

This observation has been borne in mind by Mr. ROBERTS throughout the important improvements he has effected in the chemical processes pertaining to minting, the consequence being the attainment of an almost unsurpassable standard of accuracy in the composition of the coinage now in circulation.

## Industrial Affairs in England.

Mr. B. C. LOUTH, in a recent letter from England to MESSRS. LEWIS & ROSSITER, of Pittsburgh, says, in regard to the backing down of the English Steel and Iron Association from their contracts with Mr. DANKS for the use of his furnaces, that "DANKS has since taken out patents that will make good anything not covered by the original claims, strengthening his legal position, and giving him a fair prospect of proper remuneration for his trouble. As proof that the whole of the iron men here do not concur in the action of the association, I will state that two of the iron masters of Middlesboro' have paid Mr. DANKS for the right to use his furnaces. This is as it should be, for what he has accomplished. I visited all of the principal works at Middlesboro' on Tees, and found some of them very large, especially those of the Brittania Iron Co. This company have one hundred and twenty puddling] furnaces, manufacturing rails exclusively, and have very improved machinery.

"There are several large plate mills in England, but none that I have yet seen, will compare with those of the Sligo Iron Works, and Moorhead & Co.'s, of Pittsburgh, or Abbott Works, Baltimore. I visited the blast furnaces of Messrs. Jers, Mills & Co. ; the firm has four, which are said to be the finest in the world, having eighty foot stacks, with twenty-five foot boshes ; each averages fifty tons every twenty-four hours. They use the Cleveland ores, yielding 30 per cent. My notice was attracted by their pig beds ; they do not have casting houses nor roofs over their boilers ; using over the latter Jones' patent non-conductor, which I think the best that has come under my observation ; it is composed of peat and a little oxide of iron mixed.

"The puddlers have been giving considerable trouble here. Coke that sold at fifteen shillings, is thirty-five shillings now, while coal that sold at six shillings, now costs twelve ; this all within one year. Puddlers are now getting ten shillings. Pig iron also has very much advanced in price, and is still going up. Iron masters, issuing circulars, add, 'the prices now given are subject to an advance without further notice.'

"The Messrs. Cochrane, near Middlesboro', have two blast furnaces, with stacks one hundred feet high, and thirty foot boshes. I made some inquiry in regard to cost of building blast furnaces here, and found that two of twenty foot boshes put up at same time can be built for twelve thousand pounds. This information I could not at first believe to be correct, but it is confirmed by several intelligent parties.

"In one of the works at Sheffield I observed a shear for cutting plate iron, that will cut seven and one-half feet at a single cut, of one-inch plate iron. I think this worthy of mention. I have been refused admittance to some of the works here ; this, however, is not a rule. I had heard considerable about a wire mill at Sheffield, and was anxious to see it, as it was spoken of as being ahead of all others. The roll train is built with the rolls in rear succeeding each other ; they use a billet of eighty pounds, and draw the iron down to No. 4 wire gauge, making fifteen tons daily.

"I have talked with many miners and consumers, and I am told that since the reduction in the number of working hours and increase of wages, there is one-third less coal mined now than formerly ; that the more money the miners make, the less work they do. This is not alone the case with the miners, but with many others of other branches of industry. I have inquired somewhat into this matter, and find that the more money the majority of them earn, the longer it takes to spend it, and they are not disposed to return to work until this is accomplished. Great numbers that are paid on Saturday night, will not return to their work till Tuesday and Wednesday morning. This may read somewhat strange to you, but it is a fact. At many of the large works, Monday is repair day, and it is seldom that the whole of the men are at work on Tuesday. There is a bad state of affairs existing in regard to labor and wages now, and the consequence is much feared by the intelligent people, as very much interfering with the prosperity of the nation ; production is greatly diminished by it. In many departments I find a great prejudice against the introduction of machinery where hand labor has been exclusively used ; for instance, in Manchester I found the bricklayers would not lay machine-made bricks, and had succeeded in setting aside brick-making machinery.

"A great many plate mills are now being built, and others are proposed ; these are more particularly intended for the growing trade of armor plates and other parts of iron vessels ; much of it goes to America.

"In general I find the rolling mill machinery here to be of a more substantial character and less liable to breakage than with us. Some of the foundations are wonderful in their weight. I should like much to be more detailed and particular in accounts of rolling mills and blast furnaces, but am compelled to give but a passing notice of such as I have here mentioned."

## Researches on the Consumption of Heat in the Blast-Furnace Process.

BY RICHARD AKERMAN.

Translated by FREDERICK PRIME, Professor of Metallurgy in La Fayette College, Easton, Pa.

(*Continued from page 99.*)

V. In order to more clearly understand the following calculation of the heat used in the blast-furnace process, it is necessary to know how the reduction of the iron ores takes place and is used in these calculations.

The iron can be as readily reduced by carbonic oxyd, which is thus oxidised to carbonic acid, as by contact with coal, which is thus burnt to carbonic oxyd, and in order to correctly observe the blast-furnace process, it is an important question to know if the previously existing amount of heat is increased or diminished by these various kinds of reduction. If we assume that by the decomposition of a chemical compound as much heat is rendered latent as was evolved when it was formed, then it must be admitted that as much heat is rendered latent by the iron ore as is evolved by the combustion of the iron with a like amount of oxygen. Consequently the above question is confined to ascertaining whether the iron, by its combustion with a determined amount of oxygen, evolves more or less heat than, on the one hand, by the combustion of carbonic oxyd with the like amount of oxygen, or on the other, by the combustion of carbon to carbonic oxyd with the same amount of oxygen.

In order to answer this question, it becomes therefore necessary to ascertain the amount of heat evolved by the bodies in question per weight-unit of oxygen. This heat of chemical combination is, for iron, according to DULONG, 4327, according to WOODS, 4213, according to ANDREWS, 4134 cal. In the following calculations it is assumed to be 4205 cal.

If we examine how great the heating power of carbon is per weight-unit of oxygen used to turn it into carbonic oxyd, it will be found as follows : From what has preceded, the heating effect of carbon by its combustion to carbonic oxyd is 2473 cal. per weight-unit of carbon and since in this 1 equivalent (12 parts by weight) of carbon combines with 1 equivalent (16 parts by weight) of oxygen, the heat developed by the combustion to carbonic oxyd is $2473 \times 12 \div 16 = 1854.75$, per weight-unit of oxygen used.

By a like examination with regard to the development of carbonic oxyd, by its combustion to carbonic acid, it is found to be 4205.25 per weight-unit of oxygen. For by the combustion, 1 equivalent ($12+16=28$ parts by weight) of carbonic oxyd combines with 1 equivalent (16 parts by weight) of oxygen ; and since the heating power per weight-unit of carbonic oxyd has been assumed as 2403, we obtain $2403 \times 28 \div 16 = 4205.25$. The figures by which the relations of heat are determined, which take place in the reduction of iron ores by carbonic oxyd and carbon, are therefore the following :

The amount of heat evolved by carbon when it is burnt to carbonic oxyd, amounts per weight-unit of oxygen to.....1855 cal.
The amount of heat evolved by carbonic oxyd, when burnt to carbonic acid, is per weight-unit of the oxygen.....4205 cal.
The amount of heat evolved by iron per weight-unit of oxygen is.....4205 cal.

After the heat development of the carbonic oxyd and the iron per weight-unit of oxygen have been found to be equal, it follows that in the reduction of iron ores by carbonic oxyd just as much heat is evolved by the production of carbonic acid as is rendered latent by the reduction of the ores, and consequently that the previously existing heat is neither increased nor diminished. On the other hand a comparison of the heat development of carbon and iron per weight-unit of oxygen shows, that in the reduction of the iron

ores by the oxidation of carbon to carbonic oxyd does not take place without a considerable consumption or diminution of heat. Since for every weight-unit of oxygen which is conveyed in this manner from the ores to the carbon 4205—1855=2350 are rendered latent.

If it be not granted that the reduction of the iron ores takes place by the action of carbon in the manner stated (or if it is claimed, in other words, that the oxygen of the ores cannot combine directly with carbon, but that the reduction can take place only by the combustion of the carbonic oxyd to carbonic acid, and that this latter is again reduced to carbonic oxyd by the absorption of carbon), the result with regard to the amount of heat required will not be at all changed. Since so long as the final products consist of iron and carbonic oxyd, the same amount of heat—*i. e.* 2,350 cal.—will be necessary to convey one weight-unit of oxygen from the iron ores to the carbon. In order that the truth of this assertion may be evident, it is only necessary to remember that the heat development per weight-unit of oxygen is the same for iron and carbonic oxyd; and that in consequence of this, with regard to the comportment of the heat, it must be immaterial whether in the oxidation of carbon to carbonic oxyd, one and the same amount of oxygen is obtained from the oxidized iron or from the carbonic oxyd burnt without any change of heat.

VI. A few remarks are still necessary with regard to the manner in which the carbon is burnt by the blast of the blast-furnace. Experiments made on this subject have shown that the coals next to the tuyeres are indeed burnt to carbonic acid, but this combustion is confined to a relatively very small space in front of each tuyere,* and that the carbonic acid thus formed oxidizes the surrounding coal to carbonic oxyd, and is itself reduced to the same. ($CO_2+C=_2CO$). In consequence of the high heating power of the coal when it is burnt to carbonic acid, the temperature before each tuyere is a very high one, but outside of these different *foci* the temperature rapidly decreases, owing to the reduction of the carbonic acid. The consequence is that the temperature in the different portions of the hearth of a blast-furnace is a very unequal one. The action of the higher and lower degree of oxidation is confined to this inequality in the distribution of the temperature, since the difference between the amount of heat first produced by the formation of carbonic oxyd which is again partially used, is, as already shown, just equal to that quantity of heat which would be produced, if the coal in front of the tuyeres were burnt to carbonic oxyd by the oxygen of the blast.

## The Corundum Region of Georgia and North Carolina.†

BY PROFESSOR SHEPARD, OF AMHERST COLLEGE.

Corundum has been recognized for about thirty years at several of the gold washings in the mountainous counties of North Carolina and Georgia, though rarely occurring in masses larger than would be called a coarse gravel. Upward of twenty years ago I received from Mr. PLANT, banker at Macon, Georgia, an hexagonal prism of this mineral, of a ruby-red color, measuring one and a quarter inches in diameter by three-quarters of an inch in height, said to have come from a gold mine in Habersham County, Georgia. About the same period, I was indebted to the Hon. T. CLINGMAN, of Asheville, North Carolina, for several pounds weight of a coarse sapphire, derived from a crystal originally ten or fifteen pounds weight, that had been picked up at the base of a mountain on the French Broad river in Madison County, North Carolina. No further discoveries of the kind appear to have attracted attention until the last two or three years. Within this period, however, under the stimulus of discovering an improved description of emery, many new localities of corundum have been brought to light in this region, of two or three of which I propose to give some account, derived from the examination of numerous specimens, and from information afforded by Rev. C. D. SMITH and Col. C. W. JENKS, of Franklin, Macon County, North Carolina, two gentlemen to whom we are chiefly indebted for the developments thus far made.

The corundum localities are already known to occupy a stretch of country at least 170 miles long, with a breadth of about ten miles. As the region is little inhabited and very mountainous, it is probable that the corundum zone, as it has been called, will hereafter be much extended. It is situated in a subalpine country, partly within the northeastern corner of Georgia, and extending thence, in the direction of the crest of the Blue Ridge, into several contiguous counties of North Carolina. Beginning, for example, in the northeastern corner of Jackson County, N. C., Mr. SMITH sketches it as running in a southwesterly course across Macon County, where it strikes the Georgia State line, its general direction coinciding with the trend of the Blue Ridge until it reaches the head of the Tennessee river, when it suddenly ceases on encountering the Nantegalee mountain (a spur of the Blue Ridge here running due north), to reappear ten miles to the northwest on Buck creek; whence it pursues its original course of N. E. and S. W. across the Chunckygal mountains, where it again enters the Blue Ridge, and probably continues through several of the upper counties of Georgia, as Union, Habersham, Lumpkin and Hall. Thus far the corundum is known to occur only in a single formation, which may be designated as chrysolitic rock, though from its color and some other peculiarities, it has often been confounded with serpentine. Strictly speaking, as will more fully appear further on, it is not the true chrysolite, though containing this species to some extent, in an intermingled or disseminated condition.

This chrysolitic rock does not show itself as a continuous, uninterrupted belt or formation, throughout the tract above indicated, but exists in lenticular patches or beds, accompanied more or less by a hornblendic layer on one side (the southeast), and possibly on both sides; but the prevailing rock of the region—that enclosing the chrysolitic as well as the syenitic rock—is a gneiss, somewhat characterized by containing garnet and staurolite, as well as occasional deposits of iron and copper pyrites. The interruptions in the linear continuity of the chrysolitic rock vary in extent from one to fifteen miles; though these may in some cases be reduced, after a more careful survey of the country. The transverse diameter of the chrysolitic beds varies from half a mile to a mile, or even more in some places, but narrows down to 40 feet and less, as we approach the running out of the discs.

The principal exposure of the corundum has been effected at what is known as the Culsagee mine, situated in the township of Elegée (sometimes written Elijay), situate eight miles S. E. from Franklin Court House, in Macon County. This is the centre of operations of the American Corundum Company, whose works are superintended by Col. C. W. JENKS. The chief excavations have been made on the northern slope of a mountain, at an elevation of about 2,700 feet above tide water. The strata here developed dip to the N. W. at an angle of 45°, and exhibit the following order of formations, commencing on the N.W. side of the opening:—1, chrysolitic rock somewhat mixed with anthophyllite; 2, a layer of micaceous rock; 3, a seam of chalcedony; 4, a stratum of chloritic rock (ripidolite); 5, the same, through which the corundum is irregularly diffused, sometimes in narrow veins or widening out to several feet. The chloritic layers 4 and 5 do not possess the character of a true chlorite-slate, but constitute rather a coarse rock, in which the chlorite (ripidolite) is mostly in large crystals and foliated masses, segregated without order, much as mica is in large-grained granites; but what is here chiefly remarkable is the entire absence of quartz. Narrow veins, containing, besides the chlorite and corundum, a dark blackish green spinel (mostly massive), more or less mingled with black tourmaline, traverse layers 4 and 5 in various directions. The workings have been carried down to a depth above 50 feet, and extend over a considerable space, without thus far establishing the existence of a concentrated stratum or vein for the corundum, similar to that at the Chester (Mass.) emery mine. I have not been informed as to the underlying rock of the above-mentioned strata, but suppose it to be chrysolitic, which I am led to infer is the bounding formation of the corundum series, just as gneiss rock is of the chrysolite and syenite themselves. I am not accurately informed either respecting the aggregate thickness of the layers above mentioned, but infer that they are from 10 to 20 feet. As to their linear prolongation, nothing is yet established; but it is quite probable that it is not very considerable in proportion to the thickness of the beds; and it is most likely that the corundum-bearing layers themselves will be found to constitute a series of ovoidal or discoidal masses, often repeated over the chrysolitic tract, inasmuch as the under soil and the beds of the brooks largely afford traces of a corundum sand and gravel, that must have originated from outcropings similar to that of the Culsagee mine.

I am informed by Col. JENKS that the corundum occurs under very similar circumstances at the Rabun County (Ga.) locality, situated on the road from Walhalla, South Carolina, to Franklin, and 10 or 15 miles to the S. E. of that above described. At the Cullakenee (sometimes written Cullakenih) mine, on Buck creek, in Clay County, and about 15 miles to the S. W. of the Culsagee, the corundum, though contained in the same chrysolitic rock, is nevertheless attended by quite a different series of minerals. The outcrop extends over three hundred acres. Arfvedsonite, zoisite, albite and margarite are here found as its most frequent attendants. The corundum is either white or gray, like common feldspar, or else a delicate and often deep ruby-red color. No tourmaline or spinel have thus far been noticed, though occasional detached specimens of picrolite in long and rather coarse fibres are here found.

(To be continued.)

* This certainly does not agree with BELL's ideas, nor with his experiments. He found the temperature at the tuyeres (see pp. 90, 91, vol. I. Journal Iron and Steel Institute) to be lower than above or below, and also that the gases consist essentially of carbonic oxyd and nitrogen. TURNER does not agree with this view of BELL's, but *facts*, which are such stubborn things, certainly seem to prove it, so far, at least, as our present knowledge extends. F. P.

†From the American Journal of Science and Arts.

## American Institute of Mining Engineers.

OFFICIAL BULLETIN.

### Announcements to Members and Associates.

I. The dues for the year ending May, 1873, are now payable. All members and Associates who have not paid their dues are requested to do so at once, by sending in postal orders, or checks, or money, ten dollars to the Secretary.

All members and Associates who pay their dues for each current year, strictly in advance, will have sent to their address, regularly and weekly, the ENGINEERING AND MINING JOURNAL, which is the organ of the Institute, and will contain the proceedings and transactions, and all important papers read before the Institute and all notices of meetings. Back numbers cannot, as a general rule, be sent.

II. It is expected that the more important papers read before the Institute, and the debates thereon, will be published in annual or occasional volumes to which those Members and Associates will be entitled who have paid their dues.

III. All authors of papers are requested to notify the Secretary in advance of the meetings, giving the subject and length of their papers. Attention is also called, in this connection, to Rules 12 and 13.

IV. The ninth rule has been amended, so that there will be hereafter three meetings a year, in February, May and October. The meeting next October will be held at Pittsburgh, Pa.

MARTIN CORYELL, Secretary.

Wilkesbarre, Pa.

## THE COAL TRADE.

NEW YORK, August 16, 1872.

### Anthracite Coal.

There seems to be a somewhat better feeling among dealers in certain varieties of coal. Manufacturing sizes, such as Egg and Broken, are more in request. Lehigh of all kinds is as usual in better demand than Schuylkill, so much so that a slight advance in the prices of the Pennsylvania Canal Company next week is said to be anticipated. The reasons for this, we believe, are a somewhat improving trade and a lessening of demurrage stock, which, though perhaps not very marked, is still sufficient, taken in connection with the usual expectation of an increasing business in September, to warrant an advance. What the advance will be cannot be foretold, nor do we mean to be too positive as to the fact. As to future prospects, improvement in the calls for house coals has been an unvarying feature of business for years and may be confidently expected under almost any circumstances.

At present trade shows no change. Dullness is the order of the day. The Schuylkill suspensions are not sufficiently important, as we said last week, to effect any immediate decrease in stocks and it is only after the lapse of some weeks' time, or the conjunction of other favorable circumstances, that they could really affect the trade. Wages in the Schuylkill region are to be on the basis of $1,92.03 for August.

The *Miners' Journal* says that the average price of coal in Northumberland County last month was $2,22½ on which basis wages of $2.50 per ton were paid. This is 23½ cents per ton more than coal realized in Schuylkill County, which was caused by the Northern and Western demand, for which they obtain higher prices than are obtained in Schuylkill County.

On the whole there is a glimmer of comfort. Sorely as the coal men are tried, they are looking forward to a lightening of their load within a time that does not seem so very far off as it did a few weeks ago. There has been, of course, a good deal of embarrassment, and creditors have had to be moderate in their demands. But the commonness of financial difficulties, and the plainness of their causes, have compelled the adoption of an accomodating course. Matters are even worse in parts of the coal regions than in the city.

There is a tightness of money in the Wilkesbarre district, and perhaps some other quarters, that was not exceeded in the greatest of our financial crises. Its causes are not fully understood, and all that is apparent is an absence of money, so complete, that extensions of obligations are of unavoidable frequency. Were it not for the improved banking system of the country and the healthier tone in all kinds of business, we should probably now be in the midst of one of those partial crises that in old times served to divide up the intervals between the grand crashes. But confidence in our banking institutions as well as the solid prosperity of late years greatly lessens the damage of these temporary embarrassments. In fact *embarrassments* now fairly expresses the condition of business in the regions affected. In old times the word was used as a polite way of saying that a man had gone entirely by the board.

### Bituminous.

In the Bituminous trade there is a diversity of experience. Some dealers report good sales, others are dull. Prices continue the same. The foreign steamers which have favored foreign coal heretofore, now lay in all the stock they can, in this country. Some of them are said to carry American coal for the round voyage. The "Atlantic Ferry" is now a thing of reality for there is more than a daily steamer from the port of New York, and the patronage of these lines can make a considerable difference in the consumption of our coal.

The most noteable feature of the week is the reported presence of English agents in this country, who came to ascertain if American coal cannot be made to replace that of English mines, for a time. Some shipments to British provinces have been made on English account, and with a saving of as much as $3 a ton to the purchaser. But freight to England is too high for a direct trade with that country, being put by various persons at $8 and even $10 a ton in gold. In the face of the Fall movements of grain these prices are likely to be maintained, unless the Englishmen have ships enough in their yards to institute a special coal service. However that may be, the fact that attention is publicly called to American coal in English papers, and that there is a strong desire abroad to take advantage of the low prices in the American market, with positive attempts to do so by means of special agents, will always make the year 1872 a marked one in the history of our coal trade. A month ago the English papers were ridiculing with all their force the idea, advanced in some American daily papers, that this country would one day nourish the commercial greatness of England, by exports of coal to that land of depleted collieries. We do not take such sanguine views of this matter as some of our professional contemporaries, but it is a little remarkable, that thirty days should bring about a complete change in English opinions concerning it.

### Anthracite Coal Trade for 1871 and 1872.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending August 10, 1872, compared with the week ending August 12, 1871.

| COMPANIES. | 1871. WEEK. | 1871. TOTAL. | 1872. WEEK. | 1872. TOTAL. |
|---|---|---|---|---|
| *Phila & Reading R. R† | 150,905 | 3,002,627 | 127,241 | 3,391,449 |
| Schuylkill Canal | 35,013 | 524,327 | 21,405 | 485,667 |
| *Lehigh Valley R. R. | 78,707 | 1,114,279 | 59,544 | 2,008,598 |
| Lehigh & Sus. R. R. | 35,065 | 658,729 | 37,628 | 1,040, 41 |
| Lehigh Canal | 26,845 | 274,013 | 22,726 | 410,715 |
| Scranton North | 20,203 | 2.8,011 | 15,544 | 422,972 |
| " South | 45,877 | 497,201 | 41,348 | 1,306,189 |
| Penn. Coal Co., rail | 27,850 | 304,22 | 26,978 | 710,452 |
| " " " canal | 1,979 | 6,627 | 237 | 3,235 |
| Del. & Hud. Canal Co. | 39,780 | 430,697 | 43,581 | 775,777 |
| " " East | 7,780 | 158,775 | 8,033 | 371,913 |
| " " West | 3,630 | 45,018 | 8,701 | 230,601 |
| " " South | 10,097 | 146,794 | 7,648 | 222,968 |
| Shamokin | 12,868 | 387,343 | 11,534 | 325,561 |
| Trevorton | .... | ..... | .... | .... |
| Lykens Valley Coal Co. | 2,411 | 55,573 | .. | 2,085 |
| Wyoming North | .. | ..... | .... | .... |
| Wyoming South | .... | ..... | .... | .... |
| P. N. Y. C. & R. R. Co. | .... | 104,987 | 13,252 | 396,974 |
| Williamstown Col'y | .... | .... | .... | .... |
| Big Lick Col | 3,807 | 83,259 | .... | 10,591 |
| Total | 501,917 | 8,004,482 | 445,897 | 12,207,269 |
| 1870 | 445,397 | | | 8,004,482 |
| Increase | | | | 4,202,787 |
| Decrease | 56,520 | | | |

* These figures are for the week and fiscal period commencing Nov. 30.

† Less coal transported for Co's use and Bituminous coal.

### Bituminous Coal Trade, 1871 and 1872.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending August 10, 1872, compared with week ending Aug. 12, 1871.

| COMPANIES. | 1871. Week. | 1871. Year. | 1872. Week. | 1872. Year. |
|---|---|---|---|---|
| C. & O. Canal | 15,757 | 398,168 | 17,939 | 369,513 |
| B. & O. R. R. | 25,027 | 754,075 | 24 361 | 756,524 |
| H. & B. T. R. R. | 2,602 | 213,975 | 5,632 | 180,076 |
| *Harrisburg & D. | 6,932 | 355,475 | 7,004 | 313,339 |
| *L. V. R. R. | 7,459 | 245,813 | 267 | 19,005 |
| P. & N.Y.C. & R. Co. | .... | ..... | 6,700 | 234,814 |
| Cumberl'd Branch Canal | 5,861 | 115.229 | 6,583 | 124,060 |
| " Railroad | 1,077 | 45,772 | 674 | 11,514 |
| Total | 64,715 | 2,128,507 | 69,161 | 2,008,946 |
| | .... | 2,008,946 | 64,715 | |
| Decrease | .... | 119,561 | | |
| Increase | | | 4 446 | |

### Penn. and N. Y. R. R.—Coxton, Pa.

Coal tonnage for week ending August 10, 1872.

| | Week. Tons. Cwt. | Total. Tons. Cwt. |
|---|---|---|
| Anthracite received: | | |
| From Lehigh Valley R. R. | 8,808 19 | 242,346 01 |
| " Lack. & B. R. R. | 1,4 9 17 | 54,154 08 |
| " Pleasant Valley R. R. | 1,511 01 | 65,351 03 |
| " Sul. & Erie R. R. | 1,152 01 | 35,122 03 |
| Total | 13,251 18 | 396,973 15 |
| Distributed: | | |
| To Lehigh Valley R. R. | | 22,336 10 |
| To Lack. & B. R. R. | | 1,017 17 |
| To S. Central R. R. | 2,651 07 | 73,99 1 11 |
| To Ithaca & A. R. R. | 1,407 08 | 67,658 08 |
| To Erie R. W. Pockets for shipm't. | 8,473 03 | 171,4 9 14 |
| To individuals on line of road | 177 12 | 13,731 04 |
| To points at & above Coxton for use of Co. | 390 10 | 16,264 18 |
| To points between Waverley and Elmira | 151 19 | 23,542 12 |
| Total | 13,251 18 | 396,973 15 |
| Bituminous received from BARCLAY R. R. | | |
| Shipped north from Towanda | 6,295 00 | 232,907 07 |
| Shipped south from Towanda | 405 11 | 1,769 12 |
| Northern Central R R. | | 137 01 |
| Total | 6,700 11 | 234,814 00 |
| Distributed: | | |
| To Erie Railway | 5,944 07 | 209,464 07 |
| To So. Central R. R | 327 03 | 23,255 15 |
| To Ithaca Valley R. R. | 23 10 | 57 05 |
| Lehigh Valley, R. R. | 31 01 | 1,035 19 |
| To individuals on line of Railroad. | 374 10 | 797 19 |
| To points on line of road for use of Company | .... | 202 15 |
| Total | 6,700 11 | 234,814 00 |
| Grand totals transported: | | |
| Anthracite | 13,251 18 | 396,973 15 |
| Bituminous | 6,700 11 | 234,814 00 |
| Total | 19,952 09 | 631,787 15 |

### Lehigh Canal Coal Trade.

Shipped for the week ending August 9, 1872.

| | Week. Tons. Cwt. | Week. Tons. Cwt. |
|---|---|---|
| Total from Mauch Chunk Region | 6,560 10 | 136,852 03 |
| " " Beaver Meadow " | 3,325 11 | 86,047 01 |
| " " Mahanoy " | 485 14 | 6,619 19 |
| " " Hazleton " | 8,265 12 | 130,800 09 |
| " " Upper Lehigh " | 756 04 | 16,431 00 |
| " " Wyoming " | 3,329 18 | 33,944 13 |
| Total | 22,723 09 | 410,715 05 |
| Corresponding week last year | 26,945 03 | 274,013 08 |
| Increase | | 136,701 17 |
| Decrease | 4,121 14 | |

### Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, Aug. 10, 1872.

BY RAILROAD.—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

| | Tons. Cwt. |
|---|---|
| From St. Clair | 32,794 08 |
| " Port Carbon | 6,207 00 |
| " Pottsville | 3,537 02 |
| " Schuylkill Haven | 21,348 07 |
| " Pine Grove | 4,364 02 |
| " Tamaqua | 15,362 05 |
| " Harrisburg | |
| " Dauphin | 6,414 03 |
| Total | 92,027 07 |

FOR SHIPMENT BY CANAL.

| | |
|---|---|
| Passing Frackville Scales | 8,151 18 |
| " Mill Creek " | 1,963 10 |
| " Schuylkill Valley Scales | 741 11 |
| " Mt. Carbon " | 1,015 03 |
| " Cressona " | 8,113 04 |
| " Pine Grove " | |
| " Tamaqua " | 1,237 18 |
| Total | 21,223 02 |

SHIPPED WESTWARD VIA NORTHERN CENTRAL RAILROAD.

| | |
|---|---|
| Passing Locust Gap | 2,561 07 |
| " Shamokin | 5,468 17 |
| " Herndon | ..... |
| Total | 8,030 04 |

SHIPPED WEST OR SOUTH FROM PINE GROVE.

| | |
|---|---|
| Via Schuylkill & Susquehanna R. R. | 1,113 14 |
| " Lebanon & Pine Grove Branch | 1,049 12 |
| Total | 2,163 06 |

CONSUMED ON LATERALS.

| | |
|---|---|
| From Frackville Scales | 624 19 |
| " Mill Creek " | 493 17 |
| " Schuylkill Valley Scales | 443 19 |
| " Mt. Carbon " | 650 04 |
| " Cressona " | 89 16 |
| " Pine Grove " | 110 11 |
| " Tamaqua " | 172 08 |
| Total | 2,585 14 |

LEHIGH AND WYOMING COAL.

| | |
|---|---|
| Received via Allentown, E. Penn'a br. | 64 02 |
| " " Alburtis, " " " | 25 00 |
| " " Oreland, G. & N. Br. | 785 13 |
| " " Connecting R. R. | |
| " " Willow Street R. R. | 336 11 |
| Total | 1,211 06 |

BITUMINOUS.

| | |
|---|---|
| From Harrisburg | 7,004 08 |
| " Connecting R. R., G. & N. Br. | |
| " Junction R. R. | |
| Total | 7,004 08 |

COAL FOR COMPANY'S USE.

| | |
|---|---|
| Anthracite | 5,290 08 |
| Bituminous | 191 07 |
| Total | 5,481 15 |

RECAPITULATION.

| | Total for Week. | Corres-p'g week last year. | Increase and Decrease. |
|---|---|---|---|
| Passing over Main Line and Leh. Val. Branch | 92,027 07 | 103,063 17 | d 11,036 10 |
| For Shipment by Canal | 21,223 02 | 34,145 05 | d 12,922 03 |
| Shipped Westward via Northern Central R. R. | 8,030 04 | 5,434 15 | i 2,595 09 |
| Shipped West or South from Pine Grove | 2,163 06 | 2,603 04 | d 439 18 |
| Consumed on Laterals | 2,585 14 | 3,751 15 | d 1,166 01 |
| Lehigh and Wyoming Coal | 1,211 06 | 1,906 01 | d 694 15 |
| Total Anthracite paying freig't | 127,240 19 | 150,904 17 | d 23,663 18 |
| Bituminous | 7,004 08 | 6,932 07 | i 72 01 |
| Total of all kinds paying freig't | 134,245 07 | 157,837 04 | d 23,591 17 |
| Coal for Company's use | 5,481 15 | 5,126 18 | i 354 17 |
| Total Tonnage for Week | 139,727 12 | 162,964 02 | d 23,237 00 |
| Previously this year | 3763121 04 | 3342905 00 | i 410,5 6 04 |
| Total to date | 3893148 06 | 35058: 9 02 | i 387,279 04 |

SHIPPED BY CANAL.

| | | | |
|---|---|---|---|
| From Schuylkill Haven | 19,816 00 | 33,013 15 | d 13,197 15 |
| " Port Clinton | 1,589 00 | 2,273 00 | d 684 00 |
| Total Tonnage per Week | 21,405 00 | 35,2-6 15 | d 13,881 15 |
| Previously this year | 464,.62 05 | 501,252 03 | d 36,989 18 |
| Total to date | 485,667 05 | 536,538 18 | d 50,871 13 |

### Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Saturday, August 10, 1872.

| | Tons. Cwt. |
|---|---|
| From Schuylkill Haven | 19,816 00 |
| " Port Clinton | 1,589 00 |
| Total for week | 21,405 00 |
| Previously this year | 464,262 05 |
| Total | 485,667 05 |
| To same time last year | 524,327 08 |

### Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, August 10, 1872.

| | WEEK. | SEASON. |
|---|---|---|
| North | 46,584 15 | 1,554,919 13 |
| South | 7,647 15 | 222,969 15 |
| Total 1872 | 54,232 10 | 1,777,887 08 |
| Corresponding time in 1871: | | |
| North | 54,847 04 | 609,491 03 |
| South | 10,097 08 | 146,793 12 |
| Total | 64,944 12 | 756,284 15 |
| Increase North | | |
| Decrease North | | |
| Increase South | | |
| Decrease South | | |
| Total increase 1872 | | 1,021,602 13 |
| Total decrease 1872 | 10,712 02 | |

### Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending August 10, 1872.

| | 1872. WEEK. | 1872. YEAR. | 1871. WEEK. | 1871. YEAR. |
|---|---|---|---|---|
| By Railway | 26,978 07 | 710,451 17 | 27,'50 05 | 309,222 03 |
| Canal | 237 03 | 3,235 09 | 1,079 02 | 6,626 14 |
| Total | 27,215 10 | 713,687 06 | 23,929 07 | 316,848 17 |
| Increase 1872 | 402,838 09 | | | |

## Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending August 10, 1872, with totals to date, compared with same time last year.

| WHERE SHIPPED FROM. | WEEK. Tons. Cwt. | TOTAL Tons. Cwt. |
|---|---|---|
| Total Wyoming | 9,214 17 | 360,048 12 |
| " Hazleton | 46,682 16 | 1,492,093 16 |
| " Upper Lehigh | 93 07 | 1,992 14 |
| " Beaver Meadow | 15,246 01 | 511,094 05 |
| " Mahanoy | 11,502 11 | 266,510 07 |
| " Mauch Chunk | 20 18 | 2,210 19 |
| Total | 82,810 13 | 2,633,650 13 |
| Same time last year | 102,963 00 | 1,351,416 08 |
| Increase | | 1,282,234 05 |
| Decrease | 20,152 07 | |
| Forwarded East from Mauch Chunk by rail | 59 543 13 | 2,093,588 10 |
| Same time last year | 78,707 07 | 1,114,278 11 |
| Increase | | 984,309 19 |
| Decrease | 19,163 14 | |

DISTRIBUTED AS FOLLOWS.

| | | |
|---|---|---|
| Forwarded East from Mauch Chunk by rail | 58,436 03 | 2,065,432 05 |
| do East for use L. V. R. R. | 1,107 10 | 33,156 05 |
| Delivered at and above Mauch Chunk for use of L. V. R. R. | 1.166 04 | 40,221 02 |
| To P. & N. Y. R. R. | 8,808 19 | 242,346 01 |
| To N. C. R. R., at Mount Carmel | 265 03 | 1,952 05 |
| To D. H. & W. R. R. | 622 09 | 17,678 12 |
| To L. & S. R. R. at Packerton for rail | 179 16 | 5,831 18 |
| Delivered at M'h Chunk | 27 17 | 1,197 13 |
| Delivered on line of road above Mauch Chunk | 140 09 | 11,272 18 |
| To L. S. & R. R., at Penn Hav., for railroad | | 4,950 07 |
| Do. for canal | 8,265 12 | 131,296 16 |
| To Lehigh Canal Mauch Chunk | 3,126 05 | 68,945 13 |
| To Catawissa Railroad | 664 06 | 7,458 18 |
| Total | 82,819 13 | 2,633,650 13 |

## Report of Coal Transported over Central R.R. of N. J. (Lehigh and Susq. Div.)

Week ending August 10—Compared with same time last year.

| WHERE SHIPPED FROM | WEEK 1872, tons ct | WEEK 1871. tons ct. | YEAR 1872 tons cwt. | YEAR 1871. tons.cwt. |
|---|---|---|---|---|
| Wyoming Region | 32832 16 | 32763 17 | 870139 01 | 689098 02 |
| Upper Lehigh Region | 4559 16 | 4520 03 | 120393 15 | 31296 18 |
| Beaver Meadow Region | | | | |
| Hazleton Region | 8518 03 | 7031 13 | 137414 00 | 57043 15 |
| Mahanoy Region | | | | |
| Tresckow Region | 4343 02 | 3669 17 | 86952 08 | 21309 19 |
| Mauch Chunk Region | 9961 00 | 8345 13 | 265462 10 | 103898 10 |
| Totals | 60255 17 | 56829 03 | 1480391 14 | 902647 04 |
| Increase | 4426 14 | | 577744 10 | |
| Decrease | | | | |
| DISTRIBUTION. | | | | |
| Forwarded East of Mch Chunk by Rail | 37627 11 | 35065 05 | 1040840 13 | 658728 13 |
| Forwarded East of Mch Chunk by Canal | 16390 18 | 15282 09 | 262650 15 | 148770 06 |
| Delivered at and above Mauch Chunk | 1303 15 | 1339 04 | 35138 11 | 34349 13 |
| L. V. R. R. at Packer'n | 245 09 | 475 14 | 8741 03 | 21334 00 |
| Delivered to L. & B. R. R. at Plymouth Bridge | 4708 04 | 3666 11 | 133040 12 | 39464 12 |
| Totals | | | | |
| Of the above there was transported on acc'nt of L. C. & N. Co | 16769 14 | 11967 13 | 375680 15 | 142599 11 |
| W.-B. C. & I. Co | 20791 05 | 19020 15 | 601372 18 | 500869 06 |
| Totals | 37560 19 | 30988 08 | 977053 13 | 643468 17 |
| Increase | 6572 11 | | 333584 15 | |
| Decrease | | | | |

## Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday August 10, and during the year 1872, compared with the corresponding period of 1871.

WEEK.

| | To C. & O. Canal Tons. Cwt. | To B. & O. R.R. C. Tons. Cwt | Total. Tons Cwt. |
|---|---|---|---|
| 1872 | 17,938 13 | 24,360 14 | 42,299 07 |
| 1871 | 15,757 02 | 25,027 00 | 40,784 02 |
| Increase | 2,181 11 | | 1,515 05 |
| Decrease | | 666 06 | |

YEAR.

| | | | |
|---|---|---|---|
| 1872 | 369,512 11 | 756,524 06 | 1,126,036 17 |
| 1871 | 396,167 19 | 754.074 12 | 1,152,242 11 |
| Increase | | 2,449 14 | |
| Decrease | 28,655 08 | | 26,205 14 |

## Cumberland Branch R. R.

WEEK.

| | To C. & O. Canal. Tons. Cwt. | To B.&O.R.R. Co. Tons Cwt. | Total. Tons. Cwt. |
|---|---|---|---|
| 1872 | 6 583 08 | 673 15 | 7.257 03 |
| 1871 | 5,860 16 | 1,077 02 | 6,937 18 |
| Increase | 722 12 | | 319 05 |
| Decrease | | 403 07 | |

YEAR.

| | | | |
|---|---|---|---|
| 1872 | 124.061 06 | 11,513 14 | 135,575 00 |
| 1871 | 115,728 11 | 45,772 04 | 161,000 15 |
| Increase | 8,332 15 | | |
| Decrease | | 34,258 10 | 25,425 15 |

## Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, August 10, 1872.

| | WEEK. Tons. Cwt. | YEAR. Tons. Cwt. |
|---|---|---|
| Shipped North | 15,544 04 | 422,971 14 |
| Shipped South | 41,348 10 | 1,306,879 15 |
| Total | 56,892 14 | 1,729,851 09 |
| For the Corresponding time last Year: | | |
| Shipped North | 20,203 02 | 208,010 11 |
| Shipped South | 45,877 09 | 497,200 14 |
| Total | 66,080 11 | 705,211 05 |
| Increase | | 1,024,640 04 |
| Decrease | 9,187 17 | |

## Shamokin Coal Trade.

| | |
|---|---|
| For week ending August 10, 1872 | 11,734 02 |
| Same time last year | 12,867 11 |
| Increase | 1,333 09 |
| Decrease | |
| Total amount shipped to date | 325,560 16 |
| Same time last year | 387,343 00 |
| Increase | |
| Decrease | 61,782 04 |

## Delaware and Hudson Canal Company.

The following is a statement of Coal Transpo ted by the Delaware and Hudson Canal Co. for the week ending Aug. 10, 1872.

| | FOR THE WEEK. | FOR THE SEASON. |
|---|---|---|
| By Delaware and Hudson Canal, | 43.581 | 775,777 |
| Fy Railroad, East | 8 033 | 371,913 |
| " " West | 8,701 | 230,601 |
| " " South | 7,648 | 222,968 |
| Total Tons | 67,963 | 1,601,259 |

For the same period last year.

| | FOR THE WEEK. | FOR THE SEASON. |
|---|---|---|
| By Delaware and Hudson Canal, | 39,780 | 430,697 |
| By Railroad, East, | 7,780 | 158,775 |
| " " West | 3,630 | 48,018 |
| " " South | 10,097 | 146,794 |
| Total Tons | 61,287 | 784,284 |
| Increase | 816 975 | |

## Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

| | AT NEW YORK, August 16. | | AT PHILADELPHIA. August 16. | |
|---|---|---|---|---|
| SCHUYLKILL. | R. A. | W. A. | R. A. | W. A. |
| Lump | $— — | $— — | — — | |
| Steamer, | — — | — — | — — | — — |
| Broken, | — — | — — | — — | |
| Egg | 5 25 | 4 75 | — — | — — |
| Stove | 5 50 | 5 00 | — — | |
| Chestnut, | 4 25 | — | — — | |
| Pea | — — | — — | — — | — — |
| LEHIGH. | | | | |
| Lump, (along side) | 5 35 | — — | — — | — — |
| Broken | 4 60 | — — | — — | — — |
| Egg | 4 60 | — — | — — | — — |
| Stove | 4 85 | — — | — — | — — |
| Chestnut | 4 35 | — — | — — | — — |
| Pea | — — | — — | — — | — — |
| SPECIAL COALS | | | | |
| Honey Brook, Le'h W. A. | 4 00@5 00 | | — — | — — |
| Spring Mountain " " | — —@— — | | — — | — — |
| Sugar Creek " " | — —@— — | | — — | — — |
| Sugar Loaf " " | — —@— — | | — — | — — |
| Old Comp'a " " | 4 00@5 15 | | — — | — — |
| Room Run " " | 4 00@4 50 | | — — | — — |
| McNeal " " | — — | | — — | — — |
| Girardville " " | — — | | — — | — — |
| Hill & Harris " " | — — | | 3 10@4 00 | — |
| Shamokin " " | — — | | — — | — — |
| Lykens Valley " " | — — | | — — | — — |
| Broad Top " " | — — | | — — | — — |
| McMichael " " | — — | | 3 25@4 25 | — — |
| Henry Clay " " | — — | | — — | — — |
| Powelton " | — — | | — — | — — |

## Company Coals.

August, 1872.

| | L. | Str. | Gra. | Eg. | Sto | Chest |
|---|---|---|---|---|---|---|
| *Scranton at E. Port | 3 60 | 3 85 | 3 75 | 3 85 | 4 25 | 3 80 |
| *Pittston at Newburg | 3 50 | 3 50 | 3 50 | 3 50 | 3 70 | 3 50 |
| *Lackawana at Weehawken | 3 50 | 3 50 | 3 50 | 3 70 | 4 00 | 3 60 |
| Wilk'b're at Hoboken | 3 75 | 3 75 | 3 85 | 3 85 | 4 25 | 3 90 |
| Old Co. Lehigh at PtJohn'n | 5 25 | — | 4 50 | 4 50 | 4 60 | 4 00 |
| Lehigh at Eliz. Port | 5 00 | — | 4 25 | 4 25 | 4 50 | 4 00 |

For freights to different points see "Freights."

To contractors only.

## Prices at Baltimore—August, 1872.

*Wholesale Prices to Trade*

| | |
|---|---|
| Wilksbarre, by cargo or car load | $4 60@4 85 |
| Pittston and Plymouth, do | 4 60 |
| Shamokin Red or White Ash, do | 4 75 |
| Lykens Valley Red Ash, do | 5 50 |
| Zerba Valley | |
| Troverton | |
| By retail, all kinds per ton of 2,240 lbs | 6 50@7 50 |
| George's Creek and Cumberland f. o. b. at Locust Point for cargoes | 4 60@4 65 |
| Fairmont and Clarksburg gas f. o. b. at L. Point | 6 00 |

BITUMINOUS COALS.

| | |
|---|---|
| Kittaning Coal Co.'s Phœnix Vein, f. o. b. at Phila | $ |
| Lemon " " " | |
| Cumberland Vein Coal | |
| Consolidation Coal Co.'s on board N. Y. | |
| Maryland Coal Co | " |

## Prices at Georgetown, D.C., and Alexandria, Va.

August, 1872.

George's Creek and Cumberland f. o. b. for shipping $4 75

## Prices at Havre de Grace, Md.

August, 1872.

| | |
|---|---|
| Wilkesbarre and other White Ash for Cargoes | $4 25@4 50 |
| Lykens Valley | @5 50 |
| Shamokin Red or White Ash | 4 25@4 50 |

## Bituminous Coals (Cumberland).

| | |
|---|---|
| Georgetown, F.o.b | $4.25 |
| Baltimore | 4.50 |
| New York | 6.60 |

## Prices of Gas Coals.

August, 1872.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y

| | Coarse | Slack. |
|---|---|---|
| Block House | $1 60 | $— 75 |
| Gowrie | 1 60 | — 75 |

Vessels are being chartered at $3 00 to $3 25.

Corrected by Bird, Perkins & Job, 27 South street.

| | Coarse. | Culm of Coal. |
|---|---|---|
| Pictou | $2 25 | 1 25 |
| Sydney | 2 25 | - 80 |
| Lingan | 1 60 | - 80 |
| Caledonia | 1 60 | - 80 |

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty on all slack coal or Culm: 40c. per ton of 28 bushels, 80 pounds to the bushel. On all bituminous coal or shale: 75 cents per ton of 28 bushels.

AMERICAN.

| | Currency. |
|---|---|
| Westmoreland | $7 10 @— |
| Fairmount Gas Coal Co. of N. Y. | 7 00 @— |
| Despard Coal Co | 7 00 @— |
| Penn | 7 10 @— |
| Newburg Orrel Gas | — — @— |
| West Fairmount Gas Coal | 7 00 @— |
| AT PHILADELPHIA. | |
| Westmoreland | 6 00 @— |

## Prices of Foreign Coals.

August, 1872.

Duty 75 c. per ton.

Corrected weekly by ALFRED PARMELE, No. 32 Pine street, N. Y.

| | |
|---|---|
| Liverpool Gas Caking | $ 8 00@— — |
| " " Cannel | 12 00@13 00 |
| " House " | 19 00@20 00 |
| " Orrel | 14 00@15 00 |

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

| | |
|---|---|
| Liverpool House Orrel, screened | $14 00@16 00 |
| " Cannel, " | 19 00@23 00 |

Per ton 2.000 lbs. delivered.

## Freights.—August 16, 1872.

| TO EASTERN PORTS. | Cumberland. From Georgetown. | Cumberland. From Baltimore | Anthracite. From Philadel'a. | Anthracite. From Elis. Port, Port Johnson, and Hoboken. | Anthracite. From Newburgh. | Anthracite. From Rondout. |
|---|---|---|---|---|---|---|
| Amesbury | | | | 1 75 | 1 90 | |
| Bangor | | | | | | |
| Bath | 3 00 | 2 90 | | | | |
| Boston | 2 80 | 2 75 | | 1 75 | 1 90 | |
| Bridgeport | 2 30 | 2 30 | | 1 00 | 1 15 | |
| Bristol | 2 40 | | | 1 40 | 1 60 | |
| Cohasset Nar'ows | 2 75 | | | | | |
| Derby | 2 75 | | | 1 25 | 1 10 | |
| Dighton | 2 50 | | | 1 50 | 1 70 | |
| East Cambridge | | | | 1 75 | 1 90 | |
| Fall River | 2 40 | 2 35 | | 1 40 | 1 60 | |
| Hackensack | | | | | | |
| Hartford | 2 80 | 3 00 | | 1 60 | 1 80 | |
| Hoboken | 2 00 | | | 50 | | |
| Jersey City | 2 00 | | | 50 | | |
| Lynn | | | | | 1 95 | |
| Middletown | | | | 1 30 | 1 45 | |
| Mystic | 2 60 | 2 75 | | 1 30 | | |
| New Bedford | 2 90 | 2 75 | | 1 45 | 1 65 | |
| Newburyport | 2 40 | 2 90 | | 1 90 | 2 05 | |
| New Haven | 2 40 | 2 30 | | 1 00 | 1 15 | |
| New London | 2 40 | 2 30 | | 1 25 | 1 35 | |
| Newport | 2 15 | 1 90 | | 1 40 | 1 60 | |
| New York | 2 40 | 1 90 | | 50 | 60 | |
| Norwalk | 2 50 | 2 50 | | 1 00 | 1 15 | |
| Norwich | 2 60 | 2 30 | | 1 35 | 1 45 | |
| Pawtucket | 2 85 | 2 80 | | 1 50 | 1 70 | |
| Portland | 2 90 | 2 75 | | 1 70 | 1 90 | |
| Portsmouth, N. H | 2 40 | 2 90 | | 1 85 | 2 05 | |
| Providence | | 2 35 | | 1 40 | 1 60 | |
| Rockport | | | | | | |
| Saco | | | | | | |
| Sag Harbor | 2 85 | 3 00 | | 1 25 | 1 40 | |
| Salem | | 2 75 | | 1 75 | 1 90 | |
| Stamford | | | | 1 00 | 1 15 | |
| Stonington | | | | 1 30 | 1 45 | |
| Taunton | | | | 1 90 | 2 10 | |
| Warren | | | | 1 40 | 1 60 | |
| TO RIVER PORTS | | | | | | |
| Albany | 3 00 | 2 50 | | | | |
| Catskill | | | | | | |
| Cockeackie | | | | | | |
| Coeyman's | | | | | | |
| Cold Spring | 2 30 | 2 25 | | | | |
| Fishkill | | | | | | |
| Haverstraw | 2 | | | | | |
| Hudson | 2 30 | 2 30 | | | | |
| New York | | | | | | |
| Nyack | 2 25 | | | | | |
| Poughkeepsie | 2 20 | | | | | |
| Rhinebeck | | | | | | |
| Rondout | | | | | | |
| Saugerties | | | | | | |
| Sing Sing | | | | | | |
| Stuyvesant | | | | | | |
| Tarrytown | | | | | | |
| Troy | 3 00 | 2 50 | | | | |
| West Point | | | | | | |
| Yonkers | | | | | | |

## Foreign and Provincial Freights.

August 1872.

*Foreign.*

Newcastle and Ports on Tyne, per keel of 21 1-5 tons £

Liverpool, 5 per cent primage

TO NEW YORK.

*Provincial*

| | |
|---|---|
| Sydney | $3 05 |
| Lingan | 3 15 |
| Cow Bay | 3 52 |
| Port Caledonia | 3 10 |
| Little Glace Bay | 3 00 |

TO BOSTON.

| | |
|---|---|
| Sydney | 3 00 |
| Lingan | 3 00 |
| Cow Bay | 3 00 |
| Port Caledonia | 3 00 |
| Little Glace Bay | 2 90 |

## Rates of Transportation to Tide Water.

*BY RAILROAD.*

TO PORT RICHMOND, PHILADELPHIA.

| | |
|---|---|
| Philadelphia and Reading Railroad, from Schuylkill Haven for consumption ($1 85 less 55c drawback | $1 30 |
| For reshipment | 1 75 |

MAUCH CHUNK TO ELIZABETHPORT.

| | |
|---|---|
| L. V. Railroad from Mauch Chunk to Phillipsburgh | $0 66 |
| C. R. R., N. J., Phillipsburgh to Elizabethport | 0 98 |
| Shipping expenses at Elizabethport | 25 |
| Wharfage | 10 |
| Total | $1 99 |

MAUCH CHUNK TO PORT JOHNSON.

| | |
|---|---|
| L. V. R.R., or L. & S. R.R. from M. C. to Phillipsb'g | $0 66 |
| C. R. R., of N. J., Phillipsburgh to Pt. Johnson | 0 98 |
| Shipping expenses | 25 |
| Wharfage | 10 |
| Total | $1 99 |

TO HOBOKEN

| | |
|---|---|
| L. V. R. R., Mauch Chunk to Phillipsburgh | 66 |
| Morris & Essex R. R. Phillipsburgh to Hoboken | 0 98 |
| Shipping expenses | 25 |
| Wharfage | 10 |
| Total | $1 90 |

TO SOUTH AMBOY.

| | |
|---|---|
| L. V. R. R. | 66 |
| B. & D. R. R. | 93 |
| Cam. & Am. R. R. | |
| Shipping Expenses | 3 |
| Total | $ 199 |

PENN HAVEN TO ELIZABETHPORT.

| | |
|---|---|
| L. V. R R. Penn Haven to Phillipsburgh | 0 7 |
| C. RR. of N. J. Phillipsburgh to Elizabethport | 0 98 |
| Shipping expenses | 25 |
| Wharfage | 10 |
| Total | $2 11 |

## MARKET REVIEW.

NEW YORK, August 15, 1872.

IRON.—The market for Scotch Pig remains quiet but firm. A telegram from the other side reports a decline of 3s. in mixed brands, while Coltness, Glengarnock, Gartsherrie, Summerlee and Eglinton brands are firmly held at the highest prices recently attained on account of the advance of 25 per cent. on coal in Glasgow during the past week. Iron makers there have refused to contract for future delivery; and we also understand that the steamers which have been bringing considerable Pig Iron for ballast have had proposals to bring Rails in its place, and which is likely to reduce the receipts here to some extent for some time to come. We quote Eglinton $51a52, Glengarnock $55, Gartsherrie $55a56, and Coltness $56, with sales of 350 tons Eglinton at $52a52,50; 300 do. Gartsherrie $55; 100 do. Coltness $56; 100 do. Eglinton, and 100 do. Clyde, on private terms. American is strong at $55 for No. 1, and the Lehigh brands are scarce, while North River is in better stock at $2a3 less per ton; we quote No. 1 both brands $53a55, No. 2 $51a52, and Gray Forge $48a50; we hear of no sales. English Rails are quiet, but held firmly at $75a76 for New from yard, and $73a74 from dock; we hear of no sales. Old are quiet, and the only sale we hear of is 100 tons at a private price. Scrap has been in some inquiry, and a sale of 200 tons is reported at $55 from dock, and 200 do. abroad for shipment here on terms not made public. The market for Bar Iron from store, is active, but prices are unchanged, though very strong, and tending upward. Russia Sheeet is steady, and Common Sheets are very strong at hardening prices.

PHILADELPHIA, August 12.—(From Circular of Edward Samuel.)—No. 1 Foundry and Gray Forge Pig are in demand, further advances being anticipated. Closing prices: No. 1 Foundry Pig at furnace $52a53, No. 2 $49a51, No. 3 Forge $47a48, and No. 4 White and Mottled $42a44. American Refined Bar (Mill price) 5 cents. Rails (at Mill) $85a90.

Mr. Henry McAllister, Jr. Secretary of the American Iron and Steel Association, has made a report, from which we extract the following information in reference to the *Iron* and *Steel* production in the United States for 1871:—

The production of anthracite pig iron in 1871, in the Lehigh region, was 372,000 tons, the product of the forty-three furnaces, many of which were out of blast during a considerable part of the year. The production of the furnaces in the Scuylkill region during the same time was 157,305 tons. The furnaces from Harrisburg down along the Susquehanna made, in 1871, 143,777 tons, and above Harrisburg, 9[illegible],000 tons. The production of Anthracite pig iron in the United States in 1871 was 957,008, of which Pennsylvania made 714,700 tons. The production of raw bituminous coal and coke pig iron was 570,000 tons and of Charcoal 385,000 tons, making the the total production of pig iron in the United States 1,912,608 tons. The utmost present annual capacity of the blast furnaces of the United States is estimated at about 2,500,000 tons.

The total production of rails in the country in 1871 amounted to 775,733 tons, of this amount 715,691 tons were iron, and 60,042 tons steel and steel-headed. The following statement shows the localities in which these rails were manufactured:—

| State. | Tons. | State. | Tons. |
|---|---|---|---|
| Pennsylvania | 335,694 | Maine | 13,383 |
| Illinois | 91 178 | Indiana | 12,778 |
| New-York | 87,022 | Tennessee | 9,667 |
| Ohio | 75.782 | Missouri | 8.200 |
| Maryland | 44,941 | New-Jersey | 6,700 |
| Wisconsin | 28,774 | Georgia | 7,846 |
| Massachusetts | 28,864 | West Virginia | 5,000 |
| Michigan | 14,000 | Kentucky | 6,000 |

The reports received from the rail mills indicate that a large number were in operation during a part of last year only. There are forty-eight rail mills in the country, and their utmost annual capacity is placed at about 1,000,000 tons.

During 1871 the rails imported amounted to 572,387 tons, making the total consumption in the United States 1,348,119, tons. The product of the forges and bloomeries of the country amounted to 63,000 tons in 1871—about 10,000 tons below the average of the last ten years.

The production of rolled and hammered iron other than rails in 1871 is estimated as follows:—Merchant bar and rod 330,000 tons, sheet and plate 118,000 tons, hoop 22,000 tons, nails and spikes 155,000 tons, axles and others 80,000—making a total of 700,000 tons. The product of steel is estimated at 82,000 tons of which 45,000 tons were made by the Bessemer process.

We find the following in an exchange:—The number of persons engaged in the production of raw and manufactured iron in the United States is given 940,000 of whom 140,000 are employed in the direct production of iran, and 800,000 in the manufacture of articles of iron. The value of this labor, it is asserted, if only paid at the rate of $2 per day, and allowing 300 working days to the year, would amount to $564,000,000. The value of the product estimated at $900,000,000, divided as follows:—Pig Iron, $75,000,000; product of rolling mills and forges, $138,000,000; and value of articles manufactured from iron $687,000,000.

The following is an approximate estimate of the whole production of pig iron in the world in 1871, in tons of 2000 pounds:—Great Britain, 6,500,000 tons; United States, 1,912,000 tons; France, 1,350,000 tons; German Zollverein, 1,250,000 tons; Belgium, 896,000 tons; Austria, 450,000 tons; Norway and Sweden, 280,000 tons; Russia, 330,000 tons; Italy, 75,000 tons; Spain, 72,000 tons; other countries, 200,000 tons—total, 13,315,000 tons. It will be observed that Great Britain produced about one half of the pig iron made in the world.

LEAD—Bar 9½ cents, Sheet and Pipe 11, and Tin-lined Pipe 15, less 10 per cent. to the Trade.

COPPER—Ingot continues firm as last noted, with further sales of about 200,000 lb. Lake at 34½a35 cents for forward and late deliveries. Manufactured is unchanged.

STEEL—The marked continues strong, but without change in quotations. Stock in store light.

SPELTER—Is without change—25 tons Silesian sold at 7 cents, gold.

TIN—Pig continues very quiet, and prices are nominal at 35 cents for Straits and English, and 45 for Banca, gold. Plates are in small supply, and very firm, with an upward tendency—the sales are 500 bxs. I. C. Coke, 14x20, at $12,50; 250 do. N. I. C. $10,87½; 150 do. M. F. Charcoal Terne, $13,87½; 1000 do. Coke Terne, $11,37½ all gold; and 1750 do. Charcoal Terne, on terms not made public—Charcoal Tin, is held at $16a$16,25 currency.

ZINC—We quote a further sale of 100 casks Mosselmann Sheet, at 9½ cents less 4 per cent., loss the late reduction in duty. French is quoted at 9a9½ Am. Ox. 8a9½ Manganese 4a4½.

### METALS.

NEW YORK, August 15, 1872.

IRON.—Duty: Bars, 1 to 1¼ cents ₩ lb; Railroad, 70 cents ₩100 lbs.; Boiler and Plate, 1½ cents ₩ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ₩ lb; Pig, $7 ₩ ton; Polished Sheet, 3 cts. ₩ lb; Galvanized 2¼; Scrap Cast, $6; Scrap Wrought, $8 per ton. All less 10 per cent. No Bar Iron to pay a less duty than 35 per cent. ad val.

| | Store Prices. |
|---|---|
| Pig, Scotch—Coltness ₩ ton | 56 00@— — |
| Gartsherrie | 55 00@56 00 |
| Glengarnock | 55 00@— — |
| Eglinton | 51 00@— — |
| Pig, American, No. 1 | 53 00@55 00 |
| Pig, American, No. 2 | 51 00@52 00 |
| Pig, American, Forge | 48 00@50 00 |
| Bar Refined, English and American | 115 00@120 00 |
| Bar Swedes, assorted sizes gold | 120 00@130 00 |

| | Store Prices, Cash. |
|---|---|
| Bar, Swedes, 1⅛ to 5 x ⅜ & ⅞ 2 sq. & 6 to 12 x ⅜ & ½ | 130 00@145 00 |
| Bar, Refined, ⅜ to 2 in. rd. & sq. 1 to 6 in. x ⅜ to 1 in. | — —@145 00 |
| Bar, Refined, 1⅛ to 6 by ¼ | 120 00@— — |
| Bar, Refined, 2½ to 2⅞ round 1 & 1⅛ by ¼ & 5:16 | 122 50@— — |
| Large Rounds | 122 50@132 50 |
| Scroll | 135 00@165 00 |
| Oval and half-round | 135 00@155 00 |
| Band | — —@150 00 |
| Horse Shoe | 125 00@135 00 |
| Rods, ⅜ to 3-16 inch | 120 00@160 00 |
| Hoop | 140 00@187 50 |
| Nailrod | 8¾@— — |
| Sheet, Russia, as to assortment (gold) | 17¾@ 18 |
| Sheet, Singles, D. and T. Common | —7 @— 8 |
| Sheet, D. and T. Charcoal | —7¾@— 8½ |
| Sheet, Galv'd, list 10 per cent discount | —@— — |
| Rails, English (gold), ₩ ton | 75 00@ 76 00 |
| Rails, American, at Works in Pennsylvania, currency | 85 00@— — |

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 4 cents ₩ lb; Manufactured, 45 per cent. ad val.

| | All Cash. |
|---|---|
| Copper, New Sheathing, ₩ lb | — @— 43 |
| Copper Bolts | — @— 45 |
| Copper Braziers, 16oz. and over | — @— 45 |
| Copper Nails | — @— 45 |
| Copper, Old Sheathing, &c. mixed lots | 26 @— 28 |
| Copper, Old, for chemical purposes, 14@16 oz. | — @— — |
| Copper English Pig | — @— 33 |
| Copper, American Ingot | 34¼@— 35 |
| Yellow Metal, new sheathing & Bronze | — @— 30 |
| Yellow Metal Bolts | — @— 32 |
| Yellow Metal Nails | 30 @— 32 |

LEAD.—Duty: Pig, $2 ₩ 100 lbs.; old Lead, 1½ cents ₩ lb; Pipe and Sheet, 2½ cents ₩ lb.

| | |
|---|---|
| Galena, ₩ 100 lbs | $— —@— — |
| Spanish (gold) | — —@6 50 |
| German, do. | — —@6 50 |
| English do. | 6 75 @7 12½ |
| Bar (net) | 9 25 @— — |
| Pipe (net) | — —@11 00 |
| Sheet | — —@11 00 |

Colwell, Shaw & Willard Tin-Lined Lead Pipe 15 cts. ₩ lb.

STEEL.—Duty: Bars and ingots, valued at 7 cents ₩ lb or under, 2¼ cents; over 7 cents and not above 11, 3 cents ₩ lb; over 11 cents, 3½ cents ₩ lb, and 10 ₩ cent ad val. Store prices.

| | | | |
|---|---|---|---|
| English Cast (2d and 1st quality) | ₩ lb | — 16½@— 19¼ |
| English Spring (2d and 1st quality) | | — 9¾@— 10¾ |
| English Blister (2d and 1st quality) | | — 11½@— 16 |
| English Machinery | | — 11¾@— 13¾ |
| English German (2d and 1st quality) | | — 11¾@— 12 |
| American Blister "Black Diamond" | | — —@— 14 |
| American, Cast, Tool | do. | — 15 @— 16 |
| American, Spring, | do. | — 9 @— 11 |
| American Machinery | do. | — 10 @— 10½ |
| American German, | do. | — 9 @— — |

TIN.—Duty: Pig, Bars, and Blocks, 15 ₩ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₩ cent.; Roofing 25. ad val.

| | Gold ₩ lb. |
|---|---|
| Banca | 45 @48 |
| Straits | 35 @— |
| English | 35 @35½ |

| PLATES. | Gold. | Currency. |
|---|---|---|
| *Fair to Good Brands.* | | |
| I. C. Charcoal, ₩ box | $13 50 @14 00 | $16 00 @16 25 |
| I. C. Coke | 12 50 @13 00 | 15 00 @15 50 |
| Coke Terne | 10 75 @11 25 | 12 50 @13 50 |
| Charcoal Terne | 11 75 @12 25 | 14 00 @14 50 |

SPELTER—Duty: In Pigs, Bars & Plates, $1.50 p. 100 lb

| | | |
|---|---|---|
| Plates, Foreign | (gold) p. 100 lb. | 7 00 @ 7 12½ |
| Plates, Domestic | p lb. | — 8 @— 11 |

ZINC—Duty: Pig or Block, $1.50 per 100 lb.; Sheet 2½c per ₩ Sheet ... per lb.— 10½@ 11

### San Francisco Stock Market.

BY TELEGRAPH.

NEW YORK, August 15, 1872.

Our report from the San Francisco Stock Board is dated the 13th inst. The market is irregular with but slight transactions. Savage, Chollar and Imperial have slightly declined. The remaining portion of the list with the exception of an unchanged condition in Crown Point and Gould has advanced. We cannot but attribute this dull condition of the market to the effect of the recent remarkable heated terms on our usually vivacious manipulators of Pacific Coast Mining shares. The report for to-day and the 8th inst. are as annexed.

| | | Aug. 8. | Aug. 12. |
|---|---|---|---|
| Savage | — | 160 | 160 |
| Crown Point | — | 130 | 148 |
| Yellow Jacket | — | 148 | 147 |
| Kentuck | — | 300 | 300 |
| Chollar Potosi | — | 99 | 90 |
| Gould & Curry | — | 180 | 180 |
| Belcher "New Issue" | — | 120 | 130 |
| Imperial | — | 15 | 13¼ |
| Hale & Norcross | — | — | — |
| Eureka C. V. | — | 16½ | — |

It certainly is remarkable that the city of Pittsburgh, where a steam boiler is almost a family necessity, should be without an inspector of boilers. Its citizens seem to think that in multitude of boilers there is safety, but we believe that less confident counsels will soon prevail. A movement is on foot to obtain the services of an inspector, and then, perhaps, the city will begin its boiler explosions.

## MISCELLANEOUS.

THE STOLBERG MINING AND SMELTING CO.

AIX LA CHAPELLE, RHENISH PRUSSIA,

has requested their undersigned agent to negotiate for either consignments or the purchase of American Lead and Zinc Ores. Parties in possession of such ores may find it to their advantage to address for particulars to

W. PAULSEN.
jy23:2m P.O. Box. 5,292, New York.

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## Colorado Iron Ore and Coal.

We have received a copy of a letter, written by Mr. ROBERT H. LAMBORN, in reference to a magnetic ore found in Colorado and also the fuel to be had in the same Territory, which forms a valuable bit of tes timony on the all important subject of the value of Western fossil fuels, and the possibility of introducing the iron industry there.

GEO. D. HALL, Esq.—I herewith enclose you copies of coal and iron analyses, being results of examinations of our Cañon City deposits. They show qualities that must attract you, as a manufacturer of pure iron. The iron ore is exceedingly pure, being, as you see, almost entirely free from the two most undesirable substances, phosphorus and sulphur. This fits it specially for steel making and for the production of tough fibrous bar and boiler plate iron.

The percentage of titanium, in the opinion of some metallurgists, fits the iron still more thoroughly for the manufacture of higher grades of steel.

The coal analysis shows a coal of remarkably pure composition, well adapted for the most delicate metallurgical processes. The coal with which we make our steel at Harrisburg, contains much more sulphur, as you will see by some subjoined determinations made by our chemist, Mr. McCreath, for our private use.

The sulphur exists in less quantity in Cañon City coal than in the pure Hazleton Anthracite, which is carried all over the West for use in foundries. There should be a good argillaceous ore, some yellow hematite, if you could get it, to mix with the pure magnetite, to insure ease in smelting.

Sincerely yours,
ROBERT H. LAMBORN.

Subjoined is the following certificates of analysis.

CAÑON CITY IRON ORE,

| | |
|---|---|
| Silica | 1.500 |
| Iron | 62.125 |
| Titanic acid | 12.000 |
| Alumina | .200 |
| Lime and Manganese | traces. |
| Magnesia | 2.252 |
| Sulphuric acid | trace |
| Phosphoric acid | .006—.0027 per ct. Phosphorus. |
| Oxygen by deduction | 21.917 |

ANDREW H. MCCREATH.
Chemist P. S. Co.

CAÑON CITY COAL.

Brown coal, color jet black, contains no seams of calcite. Specific gravity, 1.279. 1 cubic foot weighs 79.63 pounds.

| | | | |
|---|---|---|---|
| Coke | 61.30 | Ash, ochre yellow | 4.50 |
| | | Fixed Carbon | 56.80 |
| Volatile matter | 38.70 | Water | 4.50 |
| | | Gas | 34.20 |
| | 100.00 | | 100.00 |

Coke : slightly swollen, unchanged, semi-lustrous.

This is one of the best brown coals that I have seen. As a fuel, it is equal to some of the best bituminous coals. The ash is not very great for this character of coal, and the fixed carbon is remarkably large.

F. COX, State Chemist, Indiana.

THE SAME.

| | |
|---|---|
| Volatile Matter | 40.65 per cent. |
| Fixed Carbon | 53.69 ,, ,, |
| Ash | 5.66 ,, ,, |
| | 100.00 |
| Total Sulphur | 0.59 ,, ,, |

The fixed carbon, left after driving off the volatile ingredients by heat, is sandy in its character, without the slightest tendency to form a coherent coke. The superior adaptability of this class of non-coking coals used, in the raw state, for iron smelting has been fully proven, and there can be no doubt that the coal in question will be found equal to the best of its class. The very small percentage of sulphur found in this coal still further recommends it as an iron smelting fuel.

Respectfully, THOMAS M. DROWN.

HAZLETON COAL.

Sulphur ..... 0.70 per cent.

I.

COAL USED AT SLIGO FURNACE.

July 6th, 1872.

| | |
|---|---|
| Sulphur | .67 per cent. |
| Fixed Carbon | 58.20 ,, ,, |
| Ash | 4.95 ,, ,, |
| Bitumen and Moist | 36.18 ,, ,, |

II.

| | |
|---|---|
| Volatile Matter | 33.6 per cent. |
| Ash | 3.7 ,, ,, |
| Coke | 62.7 ,, ,, |

R. S. ROBERTSON,
of the Columbia School of Mines.

MOSHANNON COAL.

April 5th, 1872.

| | |
|---|---|
| Sulphur | .847 per cent. |
| Fixed Carbon | 71.563 ,, ,, |
| Volatile Matter | 18.570 ,, ,, |
| Ash | 6.560 ,, ,, |
| Water | 2.460 ,, ,, |

The ash grey in color.

Volatile matter contains 3,187 per cent. hydrogen.

## Mining Dividends in Germany.

The correspondent of *Engineering* gives a list of dividend paying mining companies in Germany, which shows a most flattering condition of the business. He says : In spite of the great disturbance which the late war has caused to most branches of mining and industrial enterprise, the general condition in Germany and Austria is healthy, and the best proof of this desirable state is to be found in the dividends which could be declared for the year 1871. Amongst the coal mines those near Zwickau in Saxony stand first, as they were least affected by the war, and enjoyed uninterrupted communication with Austria and the rest of Germany. The following dividends were declared : Erzgebirge Coal Association, 160 per cent.; Zwickau Bürgergewerkschaft, 140 per cent.; Zwickau Coal Company, 98 per cent.; Zwickau-Oberhohndorf, 54,5 per cent.; Gottes Segen at Lugau, 43 per cent.; Lugau-Niederwürschnitz, 35 per cent.; Oberholendorf-Schader, 26 per cent.; coal mines in Wesphalia: Borussia, near Dortmund, 25 per cent.; Arenberg Coal Company, 20 per cent.; and so on. Of metallic mines the Mansfield Silver and Copper Company paid 450 thalers per share ; Altenberg Zinc Company, (Vieille Montagne), 9.33 per cent.; Mechernich Lead Company, 8 per cent.; Silesian Zinc Company, 6 per cent.; Eschweiler Lead and Zinc Company 4 per cent. Iron companies paid also tolerably well ; so in Austria the Wolfsegg-Traunthal Company, 20 per cent.; Innerberg Hauptgewerkschaft, 9½ per cent.; Neuberg-Mariazell, 9 per cent.; Kaiserslautern Iron Works, in Bavaria, 14 per cent.

Manufacturing, both in metals and chemicals was equally profitable, and good as the past year has been, its success will be exceeded by that of this year. Mining in Germany is the compound result of public encouragement and private enterprise. It has been a constantly pursued occupation for 600 years, that is to say, its written records extend back that far. Back of that known time are the days which reach back to the Stone Age of man, during which the knowledge of ores, and their treatment made the slowest possible progress. Of the remaining 600 years just about 550 were spent in timid creeping. It is only within the last fifty years, when the developments of science gave a sure holding ground, that the old world metallurgists have dared to throw off the restraints of sectional prejudice and the evils of local training. More advance has been made within the last five years than within the whole 500 that preceded the opening of this century.

The "iron famine" now prevailing in the world, especially in our country, has brought out the fact, that to keep our railroad tracks in repair and iron for new roads, requires fully one half of all the iron production. The United States has now 65,000 miles of completed railroads.

## Engineering and Mechanical Notes

At the present day, when science can do so much to aid perseverance, it is quite common to see great benefits plucked from, what are apparently, great disasters. The rise in the price of coal in England, a rise, part of which at least, will continue for a long time to come, and which threatens manufacturers with serious difficulties and consumers with decided drafts upon their pockets, has led to a careful examination of some of the Southern counties of England for coal. It has long been conjectured that the coal fields of Northern France and Belgium are continued in England, and so long ago as 1804 a trial shaft was begun in the county of Sussex, but it was drowned out and abandoned. This shaft is now to be reopened, and we believe borings are to be made. If coal is found within a reasonable distance of grass, the gain to England will be immense.

A Philadelphia paper calls attention to the extraordinary monopoly of the stone-work on public structures in Philadelphia by the New-England quarry companies, and questions whether it is half understood. "These companies not only quarry the stone but have it cut to the finished plans of the architect, at the quarries, in which shape it is shipped hither, so that all the money for stone-work on these great buildings, which so many persons suppose to be spent here, is really absorbed by the New-England interests. In this way these concerns have become enormous and dominate the building-trade of the country in granite and marble work on fine structures. Yet there are in Delaware County very good quarries of granite ; and in Chester County beautiful green serpentine quarries ; and in Montgomery and Chester Counties quarries of superior marble, while in Walnut street, Philadelphia, may be seen dwellings of yellowish freestone from Allegheny."

In the proposed change of gauge on the Erie railroad, from 6 feet to the ordinary gauge, we may see the inevitable tendency of all experience in railroading. The battle of the gauges was a fierce one in its days, and the victory—unlike those so often gained in civil wars—is not a doubtful one. The Erie road is about the last stronghold of a system that now is without a defender. Its great extension and feeder, the Atlantic and Great Western road, is now laying a narrow gauge track and the Erie has to follow suit.

A blast furnace in Wales has just missed an accident which would have made its name quoted in works on metallurgy for all time to come. A large reservoir burst during a thunder storm and the torrent of water poured over an iron works, partly filling the blast furnace, which happily was undergoing repairs. Had it been in blast we should probably have had a most terrible and instructive disaster, which, as we have said, would have taken its place in all future works on iron working.

## Amalgams and Alloys.

During some recent experiments on amalgams, made with dry filings and mercury, with the object of obtaining one free from shrinkage, I find a law which apparently holds good in all cases, viz., that any alloy which, when reduced to filings, will harden, when mixed with mercury, without shrinkage, is also free from shrinkage when cast. An alloy containing gold, platinum, silver and tin, if poured at a clear red-heat into a warm iron mould, remains perfectly rigid, and cannot be removed from the mould without considerable force. If this alloy, in filings, is mixed with about 15 to 17 per cent. of mercury, and pressed into a solid mass into a mould, it remains tight in its place, without shrinkage, after it has become as hard as good brass, and continued heavy pressure will not force a trace of a colored solution between the mould and the plug of amalgam. Whether this law holds good with every alloy I cannot say, but it evidently does so with a great many of similar composition to the one mentioned.—THOS. FLETCHER, F.C.S., in *Chemical News*.

# THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.,
JOHN A. CHURCH, E. M.
Editors.

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WE print in our mining summary this week the most circumstantial of the reports upon the discovery of diamonds and other precious stones on the Pacific Coast. Our readers do not need to be cautioned about receiving the stories that are in circulation concerning this new "find." Probably there is no question more general just now than "Is there anything in it", meaning the discovery we refer to. That diamonds are to be found on the West Coast is pretty well established, but that they are in remarkable numbers is still doubtful, and that valuable gems are there in quantity sufficient to make the search for them a profitable pursuit, for a horde of industrious prospectors, is still more doubtful. That diamonds can exist in such numbers as to be sold by the quart is, of course, not a positive impossibility, but it, or any abundance such as that claimed for the Pacific coast deposits, is in the highest degree improbable. Certainly nothing could be worse for the diamond seeker than such a plethora of gems, and if they are hereafter to be quoted by cubic measure the fact is only a lamentable one for owners.

## The Construction of Chimneys.

There is probably no difficult and delicate construction undertaken at the present day, with so little real knowledge and confidence as the building of chimnies for manufacturies. It is usually a rule of thumb business and based upon experiences which have not received study enough to form a well-considered body of practice. There are a number of formulas, by which the size of the chimney can be calculated, when the amount and temperature of the gases which are to pass through it are known. But an average rule, such as every engineer can give on most points of practice which he thoroughly understands, is rarely found. If one makes inquiry among engineers, he is pretty sure to find that they hardly pretend to possess information on the subject. When they have a chimney to build they will go about the work as sensibly as they can, but until they make a special study of the subject they are unable to say what the best proportions are, or how to guarantee that a chimney of a certain size will do a given amount of work. In point of fact, it is not at all certain that they will know these things, when they have made a study of them. One gentleman, anxious to have the proportions of an important chimney correct, took advantage of a trip to Europe to make inquiry among engineers, and to observe the construction of new chimnies in long established works. He found that the latter could teach him nothing. In metallurgical establishments, that had made themselves famous for scientific work, he found that the only rule of practice was to make a new chimney about as big as the old ones, and if it did not answer, alter it. One works with a magnificent system of flues and chimnies had added to the number of the latter, a year before his visit, and had just completed a most unsightly addition to it. It had been a complete failure, although every man connected with the establishment was both practical and scientific, well taught and experienced in the bargain.

His inquiries among engineers met with no better success and he travelled many thousand miles and pumped many dozen men, before he found one who had a real *rule* of practice. That gentleman told him to make his chimney not less than 1 meter (40 inches) in diameter, and not less than 15 meters (50 feet) high. Then to remember that, one centimeter (four-tenths of an inch) added to the diameter would do as much service as a meter added to the height. These dimensions are given in French measure, because it was a Belgian engineer who gave the rule. As the object of the gentleman was to make sure that his chimney would perform a certain amount of work, (that is, draw a certain amount of air) and he had no object in carrying his smoke to a great height in the air, he rested satisfied with these directions. His chimney is not yet built, and if any of our readers have other rules of practice, we would like to hear what they are.

We should add that another clause of the rule, referring to stability of construction, was as follows: Make the thickness of the brickwork at the top one third meter (13 inches) then increase the thickness downwards, 1½—2 centimeters (0.6—0.8 inch) for each meter of height. A chimney 50 feet high would therefore have walls 13 inches thick at the top and 24 inches at the level of the ground. With an internal diameter of one meter or 40 inches, the structure would have a base, 7—8 feet in diameter.

## Mining Inventions.

Professor SILLIMAN, in a note to the editor, referring to a paragraph, in which we spoke of the slow progress inventions make among miners, says:

"If you will take the trouble to refer to vol. 17 of the 1st series of the *American Journal for Science and Arts* for Jan. 1830, pp. 132-140, you will find a curious and instructive illustration of the fact you allude to in your last issue (of Aug. 6) of the slowness of miners to avail themselves of improvements in blasting.

You will there find that Mr. ELI W. BLAKE, the well-known inventor of the Rock Breaker, which bears his name, and also author of many other valuable inventions—described a method of blasting in which he used a conical plug of wood—or rather a paraboloid—in length about half the depth of the space above the powder. The fuse being adjusted, the well was filled with dry sand and the blast fired. Strange to say Mr. BLAKE found that when these plugs were made of hard wood they were sometimes not blown out of the hole and could always be used several times. In this way not only was all danger of a premature explosion from tamping avoided, but much better effects were obtained from the powder.

"Yours truly,
"B. SILLIMAN."

As we said before, this subject is an old one. Probably the best information upon it is that given by the French experimenters, who determined just what the value of different forms of cartridge, and of spools was. Their report was decidedly in favor of the use of spools, but we believe it has never been put in practice in France or anywhere else.

One of the few oddities in mining is to be found at Klausen and at Kitzbüchel in the Tyrol. Mining there is done by stoping up. The drill face has two cutting edges in the shape of an X, but the real peculiarity is the hammer and the method of using it. This hammer has a handle about nine inches long, curved at the end, like the handle of a cane, and it is grasped at the curve, so that the hammer, in position for striking, hangs *downward*, while the arm is in its natural position. The whole arm is then swung backward and the hammer is brought forward, striking an *upward* blow.

This is one of those few cases in which improvement follows the line of scientific teaching. The great arc through which the hammer head swings, an arc the radius of which is about 2 feet 6 inches, gives to the hammer head a much greater velocity than it has when the blow is given from the shoulder, provided the blow is given in the same time. This is ensured by making the head very light and with a small face, hardly more than sufficient to cover a ½ or ¾ inch drill. Inasmuch as the force of a blow increases as the *square* of the velocity, but only *directly* as the mass, the superior value of the blow by this method of manipulation is as the square of the difference between the velocity of the hammer head by the two methods of striking.

The introduction of this system has been attended with the happiest results. The mine at Klausen had been condemned by the Austrian Government, but the mining superintendent of Kitzbüchel being sent for, the new method of striking was introduced and gave such good results that the intended sale of the mine was given up. These results are a much greater production of ore per man, a smaller use of powder and steel in consequence of the lighter drills. The rock at Klausen is a hard trap.

The use of this system is inseparably connected with the method of mining by stoping up, for we cannot conceive any way of using the full sweep of the arm in striking the downward blow, and it is not improbable that stoping up may be peculiarly applicable to the Klausen rock, and is therefore to be credited with its share of the good results obtained by the change. However that may be, the Kitzbüchel manner of striking is well worth consideration; and it is not so easy to carry out as any of our readers will learn, if they try it.

## Universal Power for Cities.

The supply of motive power to whole cities by means of a great central machine, the work of which shall be transmitted through the streets by means of water or air pipes, is an old and an excellent idea. But it has never yet, that we know of, been put in

operation. It is not too much to say that the increase of business, the use of machines for a vast number of operations, that have heretofore been accomplished by manual power, and the increasing danger of steam apparatus, as cities grow denser in population, are probably leading up to the realization of this dream of so many inventors.

Of the two methods proposed, air appears to be the best, but water offers additional advantages which may tell strongly in its favor. The movement of water through long pipes would develop more friction than that of air, it requires special discharging pipes for the exhaust water, the pipes which hold it are liable to be broken by the freezing of the water, and if anything does give way, the fluid damages houses, furniture and goods.

But it has side uses which make it a very valuable aid in the solution of the great question of the water supply of cities. Pure salt water would serve as well for machinery as any other, and it could be used to supply the public and private fountains of a city, a matter which in a country blessed with such hot summers as America, is worthy of much more attention than it receives. No traveller can spend a month in Rome without noticing the positive influence upon his sensations, of the innumerable fountains of that city. Rome is to-day reaping the advantage of that long line of public benefactors, who, to gain the good will of the people, or to make sure that their name would be mentioned in after times, built those great acqueducts, which, after so many ages, remain marvels of ponderous construction. It is probably the best watered city in the world, and no one, who stands by those refreshing fountains, can deny that the men who handed their names down to posterity by such excellent works, were worthy of the success they have obtained.

Could we have a fountain in every square in New York, running night and day, from early Spring until Fall, there is little doubt that the healthful results would warrant the payment of a considerable sum to a water company. The gutters could be kept clean, the salt water could be used in sinks and for similar purposes, and a very considerable saving made in the amount of Croton required. There would be no danger of a water famine, a cry which alarms us all nearly every summer, and the smaller use of water would restore a running stream of Croton to many floors, where the water now fails to run, on account of the enormous drafts made upon the store in the pipes.

On the other hand air is free from all the objections we have mentioned as applicable to water ; but it would be more subject to leakage, it would suffer a certain loss of power from cooling in the pipes, and its utility would be restricted to the one use, as a means of transmitting power ; unless ventilation by purchased air could be made popular. That would not be impossible, and the introduction of small pipes with an outlet in each room would be cheap. But this is at best a doubtful source of income.

Only a few years ago the warehouses of New York were supplied, almost without exception, with hoisting apparatus worked by hand. The youngest of us can remember when engines began to be put in. Now they are very general, and hitherto they have been most fortunately free from the disasters that attend the use of steam. But the possibility of danger, as well as the first cost of the engine and boiler, and the constant expense for coal and an engineer, are drawbacks that prevent their use by hundreds of persons who would gladly employ some means for the rapid transport of goods in their establishments. What is wanted, is a power always at hand, even in establishments that use it but little ; safe, no matter how combustible the materials around it ; cheap in first cost, and simple enough to be capable of such arrangement that a common porter could manage it, without taking out a certificate as an engineer. Both water and air offer these advantages ; and when we look at the increase in the number of warehouses and manufactories in the city, at the introduction of lifts in hotels and apartment houses, and that contemplated introduction of the same handy means of getting about, into private houses, there is no room to doubt that the establishment of a universal power in cities is one of the perfectly possible things of the future. Such a power would develop uses in unknown number. If it were to be had by the turning on of a valve, as we get water or gas, that introduction of the "elevator" into private houses, which has been suggested as a luxury for the rich, might become a common thing in the house of the average citizen. It could be made to lessen the evils of tenement houses, those nests of all that is evil.

Calculations for a work like this have often been made. M. BIEZ, in proposing such a power for Paris, a city which certainly needs it almost as much as any in the world, calculates that works producing 945 horse-power effective force, from 19,917,260 cubic meters of air yearly, compressed to six atmospheres, would cost $2,400,000. Allowing for loss through leakage, there would be 782 horse-power remaining.

The net cost of the compressed air per cubic meter would be 1·16 cents, and its selling price might be 2 cents to 3·6 cents per cubic meter. The expense per horse-power, per hour, in consumption would be 15·16 cents.

That such an enterprise will be quickly undertaken is doubtful. It is one of those things which require large capital, faith in the undertaking, and a knowledge of the certainty with which the wants of man can be calculated upon to support the largest investments of money, when they are judiciously made. There are certain parts of New York which, from the number of their warehouses, manufactories and other consumers of power, offer an excellent field for a beginning, with least possible outlay for pipes and other plant. If the task of supplying the city with power is ever undertaken, it will probably commence with one of these districts as a safe experiment.

## Air Transportation.

Mr. WHITNEY in *Iron Age* gives some interesting particulars of the cost of wire rope "tramways" as they are called for lack of a better name. After saying that the English systems are too vaguely reported to afford any basis for calculation, he gives the cost of Hallidies' system, used in the Western mining regions. The cost of this system may be quoted as follows : For "two miles of wire rope, $2,533 ; two clip drums with their supporting frames (one drum at each end of the mile section), $400 ; 17 posts with pulleys or sheaves, $510 ; 211 hook carriers for the baskets, *i. e.* metal freight receivers, $1266 ; putting the rope in position, $300." The whole foots up about $5000 to the mile, which is probably much less than the cost of any method of steam transportation in regions like the Freiberg mining district in Nevada, where there is a tramway of this kind. This line will require renewal every four years. Including the cost of this, with running expenses, and estimating the capacity of the line at 100 tons daily, the expense would be about 23 cents per ton per mile. These sums are meant to be understood in *coin*, but the difference in the cost of labor and material ought to make the cost in the East much less than the same amounts in currency.

In regard to the name *Tramway*, it is not a happy one because that word is already applied to ordinary *rail-ways*, laid on the ground. Otherwise it is good. A *tram* is a coal wagon, and any permanent construction, upon which the wagon travels is a *tramway*. If we could give the name *road* to the ground constructions and *way* to those carried through the air, our terms would be well enough. But the distinction is too slight, and besides that it is opposed to the English nomenclature, which rejects the term road. It seems better to put the word *air* in the name and call the apparatus, an air way, or something of that kind.

## Lead in Colorado.

In reference to the question whether Colorado can produce a steady supply of lead ore, the following from the Central City *Register* is of interest : "The property of the Colorado Terrible Lode Mining Company, on the west half of the Terrible Lode, is looking well. The surface improvements made by this company are extensive, and have an air of stability and permanence. The ore when mined comes to daylight through the Terrible tunnel, the track of which is extended over the road, and leads to extensive sorting and dressing floors, near which we noticed a series of jigs for the separation of the fine mineral from the smaller particles of rock. The aerial tramway carries the ore from this point to the foot of the mountain, where a capacious building, furnished with an engine and crusher, receives it. Below the road, and connected with the last-named building by a tramway, is an extensive series of jigs and dressing tables, so that the probability of any valuable mineral escaping the final separation from its accompanying gangue is small. The mine is yielding a large amount of ore, although the lower grades must necessarily remain untreated for some time to come. This mine alone could, we are satisfied, furnish Mr. Stewart's mill, large as it is, with a steady supply of ore for a year to come."

During the month of June the Pelican Lode produced one hundred and eighty tons of ore—first and second class. The first-class ore yielded $500 to the ton, and the second a fraction over $200. Of the former there were thirty-three tons, worth $15,500, and of the second one hundred and forty-seven tons, worth $29,400. It is not said that the Pelican ore is galena or other lead ore ; but we suppose that it is galena, as it is in Clear Creek County. It contains some ruby silver.

## Decomposing Action of Humus upon Minerals.

Everyone who has studied the growth of plants must have come to the conclusion that it is necessary to look beyond the gases of the air and the carbonic acid water of the ground to account for the power of vegetables to decompose many mineral substances. It is evident that some other acids come into play and exert a decisive influence. Herr SENFT, of Eisenach, Germany, has submitted the question to a long series of investigations, and the conclusions at which he arrives are well worthy of the attention of scientific men. The researches of Mr. SENFT go far to confirm the shrewd theory advanced by Professor HENRY WURTZ, of New York, that the organic acids have played a much more important part in the formation of rocks and minerals than geologists have been in the habit of conceding. It is evident that plants, while living, are able by the products of their growth to act upon insoluble minerals and appropriate certain constituents to their wants, and that, when the plant is dead, it can, during the process of decay, produce acids that either dissolve minerals or render them soluble. The conclusions to which Mr. SENFT arrives are as follows :

1. When the plant decays with exclusion of the air, it is capable of reducing metallic oxides to metals, or to oxides, with which the organic acid, called geic acid, can combine.

2. When the decomposition takes place with access of air, humic acid is produced, which can unite with the bases to form a series of salts, which are partly soluble and partly insoluble.

3. The soluble humic acid salts, especially of the alkalies, have a powerful action upon the mineral salts, and convert them into humates, which in turn are decomposed into carbonates.

4. The carbonates, phosphates, arsenates, sulphates, the chlorides and the zeolite silicates are decomposed by the humic acid salts.

5. The humic acids are themselves constantly changing, so that their action upon minerals is variable. This instability of the organic acids has rendered the investigation of their action upon mineral substances very difficult, and appears to have de-

terred chemists from pursuing the subject. The products of the decay of woody fibre, called geic acid, humic acid, ulmic acid, crenic and apocrenic acids, are really very little understood. When we pursue the subject in the path indicated by Professor WURTZ, we may some day discover that the quartz, diamond and ruby were held in solution by organic acids, and that metalliferous deposits were reduced by the same acids without the intervention of fire or of galvanic currents.

The whole question offers a fine field of research to the chemical geologist.—*Journal of Applied Chemistry.*

## About-Town Jottings.

BUSINESS AND PERSONAL.

Personal announcements and business notices inserted at fifty cents per line.

Root's Wrought Iron Sectional Boiler, manufactured by the Root Steam Engine Co., 500 to 510 Second Avenue, New York.

Utica Steam Engine Co. (formerly Wood & Mann Steam Engine Co.,) 42 Cortlandt street, N. Y.

Post & Goddard have removed to No. 111 Liberty street. Dealers in Taps, Dies, Reamers, Drills and supplies generally.

American Submerged Pump. Power attachment—cheapest and best in the market, 55 Chambers street, N. Y.

Roper Caloric or Hot Air Engine, 124 Chambers St.

Blake Bros., New Haven, Conn., manufacture Stone Breakers for crushing ores and minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

The Niagara Steam Pump Works, 23 Adams street, Brooklyn, N. Y., are now working to their fullest capacity.

## MINING SUMMARY.

### Arizona.

DISCOVERY OF PRECIOUS STONES.

From the San Francisco *Bulletin* of August 3.

The existence of deposits of the precious stones in Eastern Arizona and Western New Mexico has been quite well authenticated for many years. The Aztecs at the time of the Spanish conquest of Mexico, had large stores of rubies, emeralds and turquoises, which are not known to be found in any part of the present territory of Mexico, and which they invariably told the conquerors, came from the north. To this day diamonds, mostly of an inferior quality, rudely cut and clumsily set are exceedingly abundant in Mexico, and the fact that they have a generally similar appearance, and do not resemble Brazilian, African, or Asiatic diamonds in color, has lead to the conclusion that they came from fields somewhere on the North American Continent. It is an unquestionable fact that Central Arizona and New Mexico were occupied for many centuries before the Spanish conquest by a colony of the Aztec race, who built many populous cities, the ruins of which may be seen at this day, scattered over a territory as large as the whole Middle States. There are also many ruins which were long mistaken for temples for religious worship, being generally located on the summit of commanding hills, but which later investigations have demonstrated to have been entrenched mining camps, built in an enemy's country. One of these, in a good state of preservation, may be seen on the hill on the western border of the city of Prescott, Arizona; and between Prescott and Wickenburg, on the bridle trail which leads up the Hassiyampi river, is a very fine one, which we believe has never been described in detail by any visitor. On a broad flow of lava, extending many miles southeastwards from the now extinct volcano of Mount San Francisco, in Northeastern Arizona, many miles from water, there are in several places ruins of what were evidently mining camps. The mining operations appear to have been carried on by cutting through the lava, and getting at the gravelly soil beneath. There has been much conjecture as to whether the miners were seeking for placer gold or precious stones, the majority of visitors inclining to the belief that it was the latter.

DISCOVERY OF RUBIES.

On the barren plain near the headquarters of the Colorado Chiquito, a species of large red ant has thrown to the surface large quantities of gravel, in which, some years since, a party under Kit Carson found rubies of a deep color, varying in size from that of a grain of wheat to a small pea. Many of these were given to friends now residing in Arizona, and about a dozen of the rubies, with an emerald of very pale color, were given to a gentleman now in this city, by Fred. Henry, an old frontiersman. The emerald was brought to this city, ground by a lapidiary and pronounced genuine. The rubies were, however, too small, and the emerald too pale to be of much value. They are now in the cabinet of Wells' Female College, Auburn, New York. In 1866 a man named Lamberson, owner of a small grist-mill at Walnut Grove, on the Hassiyampi river, a few miles southwest of Prescott, showed the writer a large handful of rubies, some of which were of good size, which he said he found in his mill race in coarse gravel. He refused to sell any of them, but pointed out the spot where he claimed to have found them. The visitors spent hours panning out the gravel, in hope of finding others, but did not succeed, and residents in the vicinity positively asserted that the stones were not found there, but were a part of those brought down from the Northeast by Kit Carson's party. They certainly were identical with the latter in general appearance.

DIAMONDS HERETOFORE FOUND.

From time to time stones which appeared like diamonds have been brought here from Arizona, and last year a number of genuine diamonds were undoubtedly found there and exhibited to jewelers in this city. One of them, weighing two carats, was sent to Boston to be cut, and proved to be a genuine brilliant. The party finding them, returned to Arizona immediately for more.

On the other hand, a party of miners who went out from White Pine County, Nevada, last season, in search of these Arizona diamond placers, returned last autumn, loaded down with what they thought were diamonds, enclosed in round pebbles of about the size of a hen's egg, and perfectly satisfied that they were richer than the Bank of England. It is hardly necessary to say that the supposed diamonds were nothing but crystallized quartz, as valueless as any pebbles which could be found on the beach at Fort Point.

A few years since a party of prospectors hunting for gold on the headquarters of the Santa Maria, a branch of Bill Williams Fork of the Colorado, found several very small diamonds, of no commercial value. They also found a stone weighing 173 carats, which was supposed to be a diamond worth millions of dollars, which is now, or was recently, in the hands of Hooper & Co., on California street. It proved to be a mere lump of quartz of no value.

A COMPANY INCORPORATED.

On Tuesday afternoon a certificate of incorporation of the "San Francisco and New York Mining and Commercial Company" was filed in the County Clerk's office in this city. The objects of the company as stated are "To carry on the business of mining and exploring for gold, silver, and other precious minerals and substances of every name and nature in any and all of the States and Territories of the United States, and to do such commercial business connected therewith as the interests of the said company may require." Capital stock $10,000,000, in shares of $100 each. The names of the Trustees are Albert Gansl, William F. Babcock, Milton S. Latham, Louis Sloss, William M. Lent, Thomas H. Selby and Maurice Dore, of San Francisco; and Samuel Barlow and George B. McClellan, of New York. W. H. L. Barnes, Attorney for the Company. This is undoubtedly the organization alluded to, as being formed for the purpose of exploring the diamond and ruby fields of Arizona and New Mexico. We hope that the fullest anticipation of the projectors of the enterprise may be more than realized, and the precious stones become as abundant in San Francisco as peaches in our markets.

THE STONES ALREADY RECEIVED.

The stones already received in this city comprise several hundred diamonds, varying in size from very minute particles to stones of 100 carats. One very fine diamond weighs 108 carats. There are also a large number of rubies, many sapphires, some very large, a few black diamonds and a half dozen emeralds, the latter of an inferior quality. The value of the entire collection cannot be definitely stated, but a portion which were exhibited to a few persons in the Cashier's room of the Bank of California, Wednesday, are estimated to be worth $100,000. This does not include a quart or more of small stones, not yet carefully examined, nor does it include the large diamond before referred to.

EXCLUSIVE RIGHTS OF THE COMPANY.

Mr. Harpending asserts that the Company have already secured from the Government a title to land where the stones are found, and consequently that they have exclusive privileges, so far as the territory occupied by their agents is concerned. It is believed, however, that a much larger extent of country than that claimed by them is rich in precious stones.

PROBABLE EFFECTS OF THE DISCOVERY.

The region is not far from the line of the projected railway, and the discovery must result in the speedy settlement by Americans of a region heretofore a wilderness, or occupied only by a race of murderous savages. It will greatly assist in developing the interior of the Great Republic; will bring a fresh influx of immigration to this coast, and assist finally in regenerating not only Arizona, but the neighboring State of Mexico.

### Idaho.

The Owyhee *Avalanche* of Saturday, July 13, has the following Local Mining Record.

The Red Jacket under the supervision of C. S. Miller, is looking exceedingly well. Rich ore is being raised from both north and south shafts, which are about 500 feet distant from each other. The north shaft is down 32 feet and is being sunk at the rate of two feet per day, showing a vein of not less than 18 inches in width and ore with plenty of free gold. An average sample was taken this week from the ore being raised from this shaft, showing no free gold, and the assays were as follows: Gold $108 80; Silver, 14 13—total $122 93 per ton. In appearance this ore is quite unlike any other in camp, and is considered by competent judges to be the most favorable character of quartz to contain gold. The south shaft is down 7 feet below the adit level, or say about 60 feet from the surface. A look at the ore taken from the shaft reminds one of the early days of the Chariot and Ellmore. The Red Jacket crops out on the very summit of War Eagle and affords the best of facilities for working.

The Durango, situated a short distance west of the Empire, is now being worked by W. J. Hanks, O. R. Johnson, A. P. and John Minear. It has a shaft of 40 feet in width, at the bottom of which the ledge is about a foot wide, showing free gold in abundance. The last crushing from this mine, some six years ago, yielded $110 per ton. They intend to sink the shaft 10 feet deeper, and then start a 50-foot level. We are glad to see the Durango start up, as it will afford employment to a number of hands, and undoubtedly amply remunerate its owners.

Sands & Co. have about 80 tons of ore on the dump at the Illinois Central, and it is decidedly the richest looking pile of mineral that we have seen in camp for many a day. We noticed some pieces of quartz, weighing from 50 to 75 pounds, rich in sulphurets of silver, with a streak of gold nearly one-eighth of an inch thick, running entirely through it. This streak of gold is not confined to the quartz, but extends into the granite wall, west of the vein. The shaft is down thirty-five feet, from the bottom of which they have drifted south about the same distance. If the boys don't make big money this summer, it will be the fault of milling and not of their mine. Those who are inclined to being skeptical, as to what they say, should visit the Illinois Central dump pile.

The portions of the War Eagle hoisting works now on the ground are being rapidly put in position, and the shaft has been repaired and retimbered on the 3d level.

Chariot still at work on shaft.

After working over a year, the Morning Star boys tapped the old shaft in that mine last Sunday, since when they have been engaged in hoisting water.

Most of the placer miners are now engaged in cleaning up the season's run. Hoffer & Miller now have two hydraulics at work on their claims below the Ellmore mill, and the way they make the dirt "get up and git," is a wonder to behold.

### Nevada.

From the Reese River *Reveille* of August 3.

Mining matters in the district look encouraging, as a whole. Small undertakings are being abandoned. There seems to be but little encouragement for them. Associated labor, or capital, is essential to success. These, when judiciously applied, prove invariably successful. The principal mines of the district are all steadily improving, not only in the quantity of ore but in average quality. The mines of the Manhattan Co. all look first rate. The property of the Pacific Co., Limited, is steadily improving. This company have had frequent large crushings of late, and still have 100 tons of fine ore on hand. Captain PRIDEAUX, the Superintendent, shipped over six tons of first-class ore to London to-day, to be followed soon by another shipment of about the same amount, the object being to ascertain with what success the ores can be reduced there. The Savannah Company, a London corporation, has recently commen-

ced operations, which, we understand, will be gradually extended and extensive. We will give further details concerning this new company as their plans are matured and perfected. These English organizations go to work carefully and systematically, and never get in a hurry. As a general thing, however, they are very thorough going, and are almost invariably successful.

The bullion shipment, through W. F. & Co's express, for the month of July, consisted of 51 bars, weighing 5,305 lbs. and valued at $74,930.85.

REESE RIVER.

SAYBROOK.—Still working on the 150 foot east level; running two shifts; having commenced getting some very good ore.

SARATOGA.—Bevelhymer, who has a lease in the 160 foot west level is still getting splendid ore. It contains a large amount of native silver, many of the lumps being literally plastered over with the pure metal, which can be cleaved off with the finger nail; one specimen given us is "perfectly lovely"—a regular Dolly Varden. From the 350 foot level large and constantly increasing quantities of highest grade ore is coming out. This mine, of which we have given so many favorable reports, is said to look better than ever before. Most of this day has been employed in raising almost the pure stuff from the lower levels.

IOWA TUNNEL.—FOXWORTHY & Co. are raising a chute and breasting out from level No. 1 east; getting good chloride. JOHNSON & WOODS are raising a chute from level No.1 west, preparatory to breasting out. GRAHAM & Co. are sinking an incline on the ledge from level No. 1 west; now down 50 feet; getting magnificent ore—will crowd one thousand dollars a ton very closely. BRIGGS & Co, are opening level No. 2 from the main tunnel; getting no ore at present. There is about 15 tons from the various parts of the mine ready for shipment to the mill.

SOUTH AMERICA.—Operations are to be resumed on this mine, which is now being relieved of the large accumulation of water for that purpose.

ISABELLA.—This mine looks about the same as it did last week—good. The only new work being done is in the upper west level, which is now being driven through very hard rock.

SAVANNAH.—The shaft, which is four by eight feet, is down 100 feet; rock very hard. The shaft is being timbered substantially, and is divided into two compartments four feet square each. The nature of the rock appeared to be changing for the better when we were there yesterday.

LANE & FULLER.—(Pacific Co).—Mine still improving at all points; struck a large body of ruby ore on the Buel North Star ledge, below the break, this week; the deposit promises to be extensive. One hundred tons of ore on hand.

GROVE TUNNEL.—Continues the same as at the time of last report.

WHITLATCH UNION.—Breasting still; looks well; plenty of ore.

S. C. BAKER.—The drift from the shaft has not yet reached the old incline, but they are working night and day to get it there. No ore will be taken out till the incline is reached and cleaned out.

JANE LEDGE.—Still drifting in average ore, at a depth of 100 feet.

MORGAN & MUNCEY.—Continues good, as heretofore reported; no new work being done; considerable water in the mine.

STAR OF NEVADA.—Work confined to the main tunnel, which is steadily going into the hill.

LONE STAR.—Owing to a change being made in the hoisting apparatus but little had been done during the week; vigorous operations will soon be resumed.

PIUTE.—Being worked on a small scale, but looks well.

BOOTJACK.—Badly broken; since the split was reached nothing has been done in this claim.

SEMANTHE.—Col. Craycroft has not yet got through overhauling the hoisting works, so the mine is still idle.

FREEHOLD.—Main shaft being sunk for the purpose of opening new levels.

DIANA.—Nothing doing.

FLORIDA.—No change here worthy of note; prospecting work principally.

OREGON SHAFT.—The mines being worked through this shaft are looking well and sending up large amounts of ore. A large force of men is constantly employed.

YANKEE BLADE.

KING AND KELLY.—A force of twenty men is now employed in these works, and things are being crowded ahead vigorously. The mine still looks well.

CHASE TUNNEL.—A body of very good ore was struck in this tunnel recently, and prospects encouraging.

ENSIGN AND SOUTHAL.—Sinking on the ledge; good ore coming from the incline at a depth of a little over 50 feet.

PATRIOT.—About the same as reported last week.

VIRGINIA.—Hammering away in the new tunnel; rock hard.

SLOAN AND COOPER.—Running eastward on the ledge; no material change to report.

## California.

AMADOR COUNTY.

The Amador *Ledger* of the 27th says the forty stamps of the Original Amador mine are pounding away on the large accumulation of valuable rock taken from the mine during the construction of the mill.

Bids for the construction of Sutter canal are advertised for in the *Ledger*. But eight miles on the upper end remain unfinished, and the estimated amount required to finish the canal is $60,000. The *Ledger* says when this canal shall be completed and a steady supply of water conveyed through it, it will become the most valuable and productive property in Amador County.

BUTTE COUNTY.

The *Northern Express* of the 27th says: The Alder creek claims pay from $3 to $4 per day to the hand, with rocker. There are six in the company, holding 300 feet each. If these claims could have water they would be very valuable. As it is, the water lasts only two months and a half in the year. Water can be brought in quantities to last all the year from the west branch of Feather, but it needs capital to effect this. By hydraulic process these claims would pay $25 per day. The Negro claims on Alder creek are laying a flume preparatory to cleaning up. The ground prospects well. Gamblers' Gulch quartz claims are paying from $1,50 to $2,50 per day to the hand, by wheeling the decomposed rock to the water and washing. Georgia Slide, on Gamblers' Gulch, is paying about the same by ground-sluicing. The Bull creek mines have paid very well the past season.

The Marysville *Appeal* says: The news from the Cherokee mines, Butte County, is very encouraging. The Spring Valley Company cleaned up about $50,000 last week. This makes about $200,000 taken out by this company during the season. The Cherokee Company has cleaned up $82,000 during the season. Both of these companies have now nearly exhausted their water supply.

CALAVERAS COUNTY.

The Calaveras *Chronicle* of the 27th says the sinking of the central shaft in the Gwin mine has developed an immense body of rich ore, extending from the surface down, but it will not be disturbed until the shaft reaches a depth of 200 feet or more. A wide ledge of first grade ore also shows itself in the bottom of the 500-foot level in the south shaft, and the work of sinking 100 feet deeper will be commenced next Monday morning. When that work is accomplished and "stoping" commenced in the central shaft, rock enough will be mined to keep all the batteries—70 stamps—in constant motion.

Of the Woolverine mine the *Chronicle* says the ore in the 2 0 foot level develops very rich, some of it $3,000 per ton.

The Sanderson mine is now ready for active operations. The vein in the north level prospects better than expected. GAMBLE & Co., west of Independence, met a fine body of ore in the south level containing a valuable streak of solid sulphurets.

Preparatory work is going on at the Lone Star, on the North Fork, with the view of reopening this mine. At forty feet, water was met in the main shaft of the French Lead, near West Point. A portable engine will be put on the shaft immediately, to test the mine. The Blazing Star shaft continues to yield ore, worth $100 per ton. Work has been commenced on the Josephine.

EL DORADO COUNTY.

The *Mountain Democrat* says the new ten-stamp mill on the Cedarburg mine, near Greenwood, is nearly completed, and will probably commence crushing rock some time next week. The company are down at a depth of about sixty feet on the ledge, at which point it is immensely rich, in fact it has been that way from the start. It is not only one of the richest but also one of the most singular deposits yet discovered in the county. We understand that very rich ore has been discovered in the northern extension of this mine.

NAPA COUNTY.

The *Reporter* says the numerous mines of Cinnabar in this county are reported to be in a promising condition. Valley mine has yielded 13 flasks within a month, and the Washington with a force of five men, has yielded 28 flasks and a net profit of $1,000 within the same period. The Phœnix has 4,000 tons of ore on hand, and has just resumed the work of reduction after a stoppage of four weeks for the modification and repair of its works. It is now prepared to furnish a large and continuous supply of quicksilver. The Oakville is also successful in operation. The Whitton mine, lately sold for $45,000 is awaiting the erection of the reduction works.

SANTA BARBARA COUNTY.

The Santa Barbara *Press*, of the 19th, has the following: Gold has been discovered on the head waters of the Piro Creek, in the northeastern portion of this county, about fifty miles distant from this town. It is of excellent quality; worth $19 per ounce, and is found in coarse flakes. Two companies of fifteen persons each have been organized here to work these two mines. A water company has also been formed to construct a ditch, so as to lead the head waters of Piro Creek, called Snel Creek, to the new mines, for washing out the gold.—(*San Francisco Bulletin*.

## Montana.

From the Deer Lodge *Independent*, of Aug. 3.

THE SOUTHERN MINES.

SILVER BOW

is among the best mining camps in the Territory this year. There is an abundance of water, and it is sold at reasonable figures. The mines are paying good wages, and there are no idle men in the camp. Business is also very fair. There are a number of Chinese companies at work, but not so many as last year. At

ROCKER

the miners are all busy, and are doing moderately well, but the best mines are worked out. The mines in

SILVER BOW CREEK,

between Rocker and Butte, are still worked with fair results. Messrs. Ousley and Noyes have rich claims and are taking out considerable money. The water is likely to hold out during the entire season. The placer claims at

HIGHLAND

are nearly exhausted. But two companies are working in the main gulch, and they are not doing very well. The Nevins and Only Chance Companies are running five arastras, and are doing as well as usual. Both companies are taking out some ore, and will probably keep their arastras running during the season. They are, however, employing but few men. At

MOOSE CREEK

Messrs. Falkner & Co., Dodge & Co., and George H. Kidder, are working the placer mines with good success. Messrs. Parks & Dickey are running their arastras on ore from the Dixie lode, and are doing well. They have a fine body of ore in the mine, and will probably keep their arastras running steadily during the fall and winter. They have one of the best mines in the country. Lafing, Marceau, & Co. are running an arastra on ore from the Canadian lode, have one of the best arastras in the country, and keep it constantly running. They have crushed float quartz and gravel from the top of the lode that pays about $50 per ton. They have a fine lode, but their mine is now nearly full of water. They have a tunnel run to tap the lode at a depth of 200 feet. It is now within a few feet of the lode, and will drain it thoroughly. There is no work being done on the silver lodes of the district. Messrs. McChord & Co. have found some very good mines in Soap Gulch, and are now constructing a ditch from Moose Creek. They will have it completed in time for use next spring.

ARGENTA

is rather dull. One company is working on a bar opposite town, with fair results. The Bohm furnace is in full blast, and is turning out about two tons of bullion per day, worth, on an average, $2 0 per ton. The smelting work is under the management of Mr. F. Bohm. The Tootle, Leach, & Co. furnace is idle, and it is not certain that it will be started up this season. G. W. Stapleton, Esq., has a very rich lode a few miles from Argenta, that is called the New Departure. He has been offered $80 per ton for the ore on the dump. The lode is three feet in width, and a large amount of first-class ore is being raised daily.

BANNACK,

known abroad as the oldest town in the Territory and at one time the home of Henry Plummer, the chief of the "road agents," and at home as the place that gave birth to that ponderous document known as the "Bannack Statutes," is still a place of importance. It has lost much of its ancient glory and business importance, but is now slowly recovering. The placers are nearly exhausted, and but few men find remunerative employ-

ment in them. The quartz mines are now receiving attention, and considerable work is being done on the various ledges near the town. Messrs. Shenon & Wadam are running a small mill on ore from the Wadam lode, and are also crushing tailings that were run through a mill several years since. They are doing remarkably well. They certainly have the best arranged mill in the Territory. Arastras are used for amalgamating that are rigged upon a novel principle, and are worthy of inspection by those who contemplate milling gold ores. Messrs. Brown & Merry have erected a similar mill above town to crush ore from the St. Paul lode. It will be in operation about the first of August. These gentlemen have 100 tons of first-class ore on their dump, that will yield over $100 per ton. They have four shafts sunk on the St. Paul, of the following depths: 90, 80, 60 and 50 feet, and are running a tunnel that will tap the lode at a depth of 150 feet. Col. Wood is running a prospecting mill about four miles north of Bannack, upon ore from the Huron and Blue Wing lodes, but at the time we were there he had made no clean-up, and therefore are unable to speak of the result. He uses a patent crusher, and amalgamates in four iron pans with stone drags. We doubt not that he will make a success of his mill, after he gets fairly under way. There is a large amount of high grade ore on many of the dumps—several thousand tons in the aggregate. Mr. Roe is preparing to start the Dwyer furnace in a few days. He has a large quantity of ore and coal at the furnace, and is confident of success. A joint stock Company, composed of the business men and miners of Bannack, furnish the necessary funds to make a fair experiment.

## Advertisements.

*The special advantages of the* ENGINEERING AND MINING JOURNAL, *as a medium for advertisers, are so great and so widely known that it may seem almost needless to call attention to them. It is extensively circulated among the engineers of the country and takes a position in this respect before any other publication of the kind. It has a large and constantly increasing circulation among miners and mine owners, and men connected with mining operations generally. As it is the only paper in the country that makes this subject a specialty it has this field entirely to itself, and is the only direct and reliable means of reaching this class of persons. Being kept on file by almost every subscriber, it is doubly valuable as a permanent means of keeping an advertisement before the public. It is the Organ of the* AMERICAN INSTITUTE OF MINING ENGINEERS, *and is regularly received and read* BY ALL THE MEMBERS AND ASSOCIATES *of that large and powerful society,* THE ONLY ONE OF THE KIND IN THIS COUNTRY. *It is therefore the best medium for advertising all kinds of machinery, tools and materials used by engineers or their employees. It is the recognized organ of the coal trade, and is taken extensively by the trade throughout the country, and presents the very best means of reaching that very important class of men.*

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*The rates of advertising, compared with those of other weekly industrial publications, are very low, especially when the class of consumers among which its large circulation is almost entirely confined, is taken into consideration.*

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**Inside Pages.....35 cents a line.**

*Engravings may head advertisements at the same rate per line, by measurement, as the letter-press.*

### MISCELLANEOUS.

## BLAST FURNACES
### FOR LEASE
### AT MOUNT SAVAGE, MARYLAND.

The UNION MINING COMPANY, Proprietors of the old MOUNT SAVAGE IRON CO., offer for lease their Blast Furnaces (two) of 13 and 16 feet bosh respectively, capable of producing 300 tons per week. The situation of these Furnaces in the heart of a country offering coal and limestone of the best quality at the lowest cost, and within short and cheap reach by railway connection of the ore-beds of Pennsylvania, presents to capitalists a favorable opportunity for investment. Within a few weeks a thorough connection by rail between the Furnaces and Philadelphia and New York will be completed. For terms apply to

JAMES S. MACKIE, President.,
72 Broadway, New York.
or JAMES A. MULLHOLLAND, Vice President,
Mount Savage, Maryland.

SUPERIOR RAIL MILL.—CAPACITY: 1,000 TONS PER WEEK.

## Harbaugh, Mathias and Owens,
Manufacturers of
## RAILROAD IRON,

**Office, corner Fifth Avenue and Smithfield Street, Pittsburgh.**

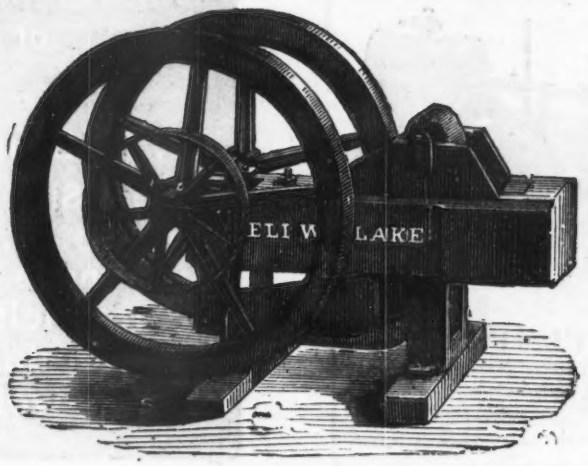
Our central location enables us to draw from both sides of the Allegheny Mountains Metals and Ores best adapted for making a No. 1 Rail, and together with our Improved Machinery, are a sufficient guarantee of our ability to produce Rails of a quality unsurpassed for durability and strength, by any foreign or domestic manufacture.

New Patterns, of any desirable weight, made to order on Short Notice.

We respectfully solicit orders for New Rails, or Re-rolling. June 25,1y

### MISCELLANEOUS.

## BLAKE'S STONE BREAKER.




The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

Illustrated circulars, fully describing the machine, with ample testimonials to its efficiency and utility, will be furnished on application, by letter to the undersigned.

☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent facesor jaws actuated by a revolving shaft and fly-wheel, are made and used in violation of our patent.

Mch. 14-1y. **BLAKE BROTHERS, New Haven, Conn.**

JOHN A. GRISWOLD, ERASTUS CORNING, ERASTUS CORNING, JR., CHESTER GRISWOLD.

## JOHN A. GRISWOLD & CO.,
PROPRIETORS OF THE
## RENSSELAER IRON WORKS,
**TROY, N. Y.**

**Bessemer Steel Works, Fort Edward Blast Furnace and Columbia Blast Furnace**

**MANUFACTURERS OF PIG IRON, RAILROAD, MERCHANT AND SHIP IRON,**

**Bessemer Steel Rails, Axles, Tyres, Shafting Plates and Steel Forgings,**

OF ALL DESCRIPTIONS.

**Office in New York, No. 56 Broadway.**

May 17:1y

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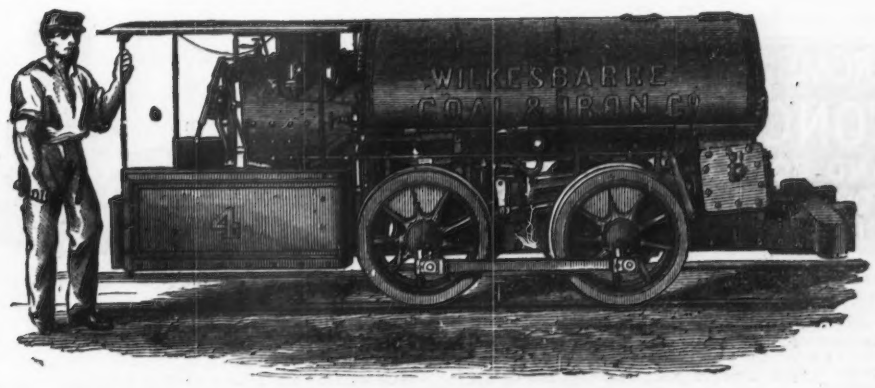
GORDON MONGES, Treasurer. B. C. WEBSTER, President.

**WORKS, BETHLEHEM, PA OFFICE, 333 Walnut Street, Philadelphia.**

JOHN JEWETT & SONS, AGENTS, 182 FRONT STREET, NEW YORK.

OXIDE OF ZINC, SPELTER, SHEET ZINC.

Jun28:1y **SPIEGELEISEN CINDER FOR BLAST FURNACES.**

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Gauge, two feet six inches or upwards; Hight above rail, five feet four inches; Width over all, five feet one inch. Adapted to burn Anthracite or Bituminous coal or coke.

**Materials and Workmanship Equal to those in Full Gauge Railroad Locomotives.**

Guaranteed to pass curves of twenty-five feet radius and haul on a level track in good condition

**Three Hundred and Forty Gross Tons of Cars and Load**

For Photograph and all particulars, address M. BAIRD & CO., Baldwin Locomotive Works, Philadelphia.

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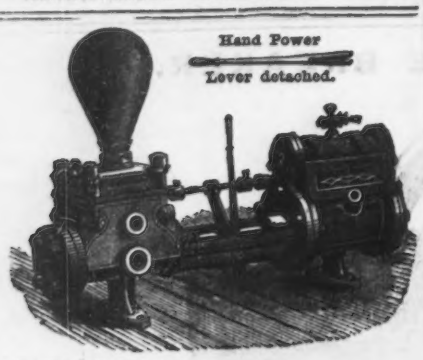


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MANUFACTURERS OF BLAKE'S PATENT
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No. 79 LIBERTY STREET, NEW YORK.

Factory 61 Chardon St., Boston, Mass.

A specialty made of the manufacture of DOUBLE-ACTING PLUNGER PUMPS for mining purposes—combining economy of space, capacity, and great durability. All wearing parts made of composition metal.

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ENGINES, PUMPS AND BOILERS,
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WARING & PARKE, Engineers.
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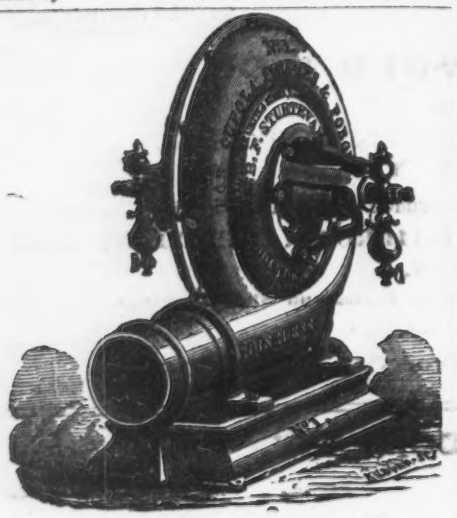

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**PATENT IMPROVED**
**PRESSURE BLOWER,**
FOR CUPOLA FURNACES AND FORGES.

Also manufacturer of the Sturtevant Patent Improved Fan Blower and Exhaust Fan. Send for illustrated catalogue.
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KROM'S PATENT DRY ORE
**CONCENTRATOR**
AND COMPLETE MACHINERY
FOR CRUSHING SCREENING
AND CONCENTRATING ORES.

Minerals and Ores in which the difference of specific gravity is so slight and which are also sometimes in such fine particles as to defy separation by any other machinery or method, are rapidly separated by this Concentrator.

Mr. W. Bement, of Georgetown, Col., concentrating Silver ores, says: "I am satisfied your machines can not be beaten; they are simple, require no power (comparatively,) and do not get out of order."

A comparison is challenged between the results obtained by the approved methods of water concentration and the complete system of dry-ore concentration in the amount of ore saved, quantity concentrated, economy of working, and comfort of the operators and workmen.

**Parties interested in mining** are invited to call at No. 210 Eldridge street, New York, where they may see a machine in operation and have samples of their own ores crushed and concentrated.

For information and circulars, apply to
**S. R. KROM.**
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## MISCELLANEOUS.

**The Bessemer Steel Works,**
of John A. Griswold & Co.
Troy, N. Y., May 3, 1872.

B. F. Sturtevant, Boston, Mass.,

Dear Sir. We have changed your No. 8 for your No. 9. Pressure Blower. The time in melting is about the same with either Blower. We are melting 225,000 lbs. (112½ tons,) Pig Iron daily, (20 hours running time.) It works well.

BARNEY MEE. Supt.

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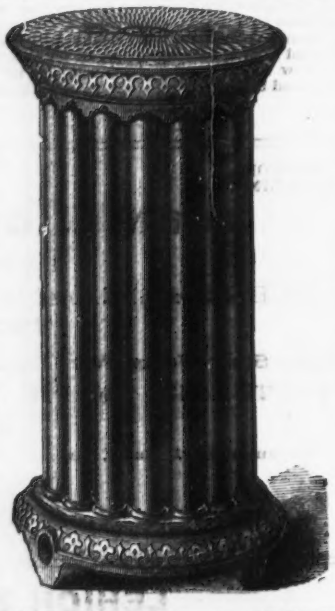

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JOSEPH NASON & CO., 61 BEEKMAN ST., corner of Gold street.—WROUGHT and CAST-IRON PIPES; all kinds of STEAM and GAS FITTINGS; Apparatus for WARMING and VENTILATING BUILDINGS.
JOSEPH NASON. HENRY R. WORTHINGTON.
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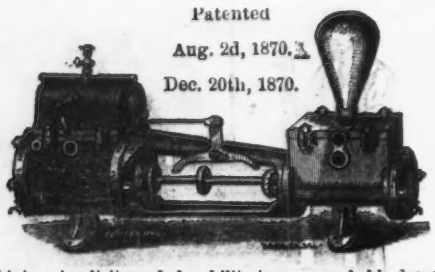
STEAM PUMP
**A. CARR, Manufacturer & Proprietor.**

Patented
Aug. 2d, 1870.
Dec. 20th, 1870.



Combining simplicity and durability to a remarkable degree. Its parts are easy of access, and it is adapted to ALL PURPOSES for which Steam Pumps are used.
AS A MINING PUMP
It is unsurpassed. Also,
**Steam, Gas and Water Pipe, Brass Work. Steam and Water Gauges, Fittings, etc., etc**

Send for Price-List and Circulars.
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55 Cedar street, N. Y.

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**Peteler Portable Railroad Comp'y.**
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**To Contractors, Miners, etc.**

By this invention one horse does the work of ten, and one man the work of eight.
The great labor-saving invention of the age.
**CARS AND TRACKS FOR SALE.**
Samples at the office. New Illustrated Circulars free. State-Rights for sale.
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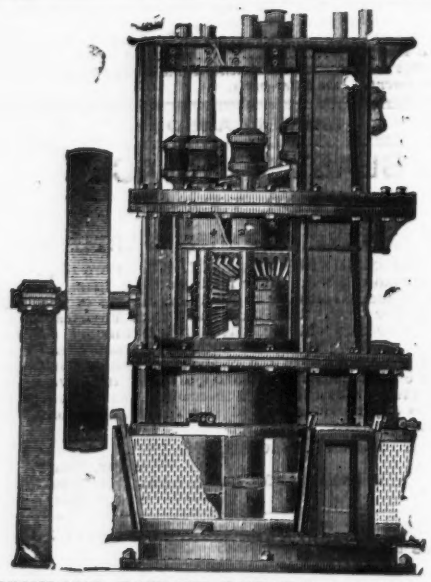

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of 12 stamps. It requires no frame to put it up. The best Battery ever used for amalgamating gold, or crushing silver ores dry or wet. Can be put up on a mine in running order for one-half the price of the straight battery, and in three days after its arrival at the mine. 12-stamp battery, 20,000 pounds, with frame complete; 6-stamp battery, 7,000 pounds. Every mill run at shop before shipping.

**CALIFORNIA STAMP MILLS,**

All the various styles of Pans, Amalgamators, Rock Breakers, Separators, Settlers, Concentrators, Dry or Wet, for working Gold, Silver or Copper Ores, the same as built in California and at lower prices. SHOES AND DIES made of the best white iron. Send sizes and we will make patterns and forward Shoes and Dies at low prices. Engines, Boilers and fixtures, and other Machinery made to order.
☞ Send for a Circular.
Address MOREY & SPERRY,
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ROOMS 90, 91,
**71 Broadway, N. Y., and Wilkesbarre, Pa.**

Reports on the value of mineral property—advises on the working and management of mines—makes detailed plans and estimates for mining improvements and appraisements of the value of mines, mining machinery &c., and gives information as to the value of mining stocks &c., as investments.
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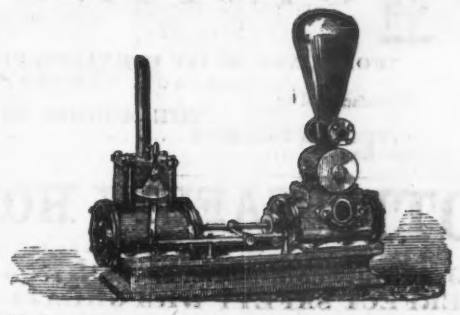
## STEAM PUMPS.


Niagara Steam Pump Works.



This Pump has taken the first premium at every Fair in the United States where there has been a practical test.

CHARLES B. HARDICK,
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Sole Manufacturer of
HARDICK'S PATENT DOUBLE-ACTING
STEAM PUMPS AND FIRE ENGINES,
Patented in England, Belgium and France. Send for circular. feb-13-1y

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MANUFACTORY,
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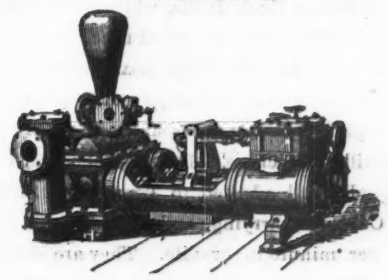
Steam Pumping Engines, Single and Duplex, Worthington's Patent, for all purposes, such as Water Works Engines, Condensing or Non-condensing; Air and Circulating Pumps, for Marine Engines; Blowing Engines; Vacuum Pumps, Stationary and Portable Steam Fire Engines; Boiler Feed Pumps, Wrecking Pumps,
MINING PUMPS,



Water Meters, Oil Meters; Water Pressure Engines.
Steam and Gas Pipe, Valves, Fittings, etc. Iron and Brass Castings.
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59 Beekman street, New York

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**Patent Fly Wheel**
STEAM PUMP,
AND
STEAM ENGINE
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These pumps are the cheapest first-class pumps in the market.
All sizes made to order at short notice.
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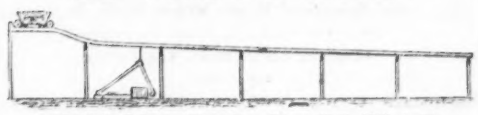
**STEAM PUMPS,**
**Double Acting.**
Bucket Plungers are the best. Send for Circular. Valley Machine Co. Easthampton, Mass

**60 Tons Per Hour.**



**AUTOMATIC RAILWAY,**
For the use of Coal Yards, Furnaces, &c., requires neither
**STEAM OR HORSE POWER.**
Address,
C. W. HUNT,
West New Brighton,
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Forwarders and Dealers in
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Docks opposite foot of Main Street,
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Railroad Iron, Iron Ore and other heavy Freights Tooked and forwarded. april 9:3m

**CUMBERLAND COAL,**
MINED BY THE
CONSOLIDATION COAL COMPANY,
Of the best quality for manufacturing, steam generating, domestic purposes.
Orders received by the Cargo at
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Mines at Newburgh, Preston Co., W. Va.
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This Company offer their very superior Gas Coal at lowest market prices.
It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.
It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York, the Brooklyn and Citizens' Gas Light Companies of Brooklyn, N. Y., the Baltimore Gas Light Company of Baltimore, Md., and Providence Gas Light Company, Providence, R. I.
The best dry coals shipped, and the promptest attention given to orders. sep21-1y

THE DESPARD COAL COMPANY OFFER THEIR Superior DESPARD COAL to Gas Light Companies throughout the country.
MINES IN HARRISON COUNTY, West Virginia.
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AGENTS:
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Among the consumers of Despard Coal we name Manhattan Gas Light Co., New York; Metropolitan Gas Light Co., New York; Jersey City Gas Light Co., Jersey City, N. J.; Washington Gas Light Co., Washington, D. C. Portland Gas Light Co., Portland, Maine.
☞ Reference to them is requested. may30-1y

COXE BRO.'S & CO., CROSS CREEK COLLIERY, MINers and Shippers of the Celebrated
Cross Creek Free Burning Lehigh Red Ash
COAL.
FROM THE BUCK MOUNTAIN VEIN.
OFFICES:
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Agent in New York, SAMUEL BONNELL, Jr.,
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DETMOLD & COX,
ANTHRACITE AND BITUMINOUS
COALS.
Office, 40 Trinity Building, New York. jan 23-1

STEPHEN S. LEE & SON,
Miners and Shippers of
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Miners and Shippers of the best George's Creek Cumberland Coal.
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W. W. BRAMHALL, Secretary & Treasurer.
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WOOD ENGRAVING
EXECUTED AT THE OFFICE OF
The Engineering and Mining Journal
No. 37 PARK ROW, NEW YORK CITY.

TUNGSTATE OF IRON OR WOLFRAM ORE, imported specially for Steel Makers, by
L. & J. W. FEUCHTWANGER,
55 Cedar street, N. Y.

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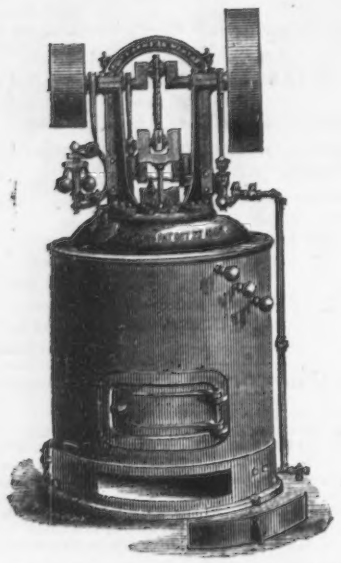
### BAXTER ENGINE



**ENGINE READY FOR USE.**

THE BAXTER STEAM ENGINE is manufactured by Colt's Patent Fire Arms Manufacturing Company of Hartford, Ct., whose reputation for exact mechanism is well known, and who fully guarantee their work.

Every Boiler is tested under inspection of the Hartford Steam Boiler Insurance Company, and by them guaranteed and insured.

We therefore feel justified in claiming that, in points of mechanical construction, safety, and durability, the

**BAXTER ENGINE**

as no equal; while in simplicity of construction, economy of space and fuel, it stands without a rival.

Over three hundred engines are now in use, and giving entire satisfaction.

Sizes—2, 3, 5, 8, and 10-horse power.

THE MOST ECONOMICAL ENGINE IN THE WORLD.

Call and see them or send for Circular and Price List to

WILLIAM D. RUSSELL,
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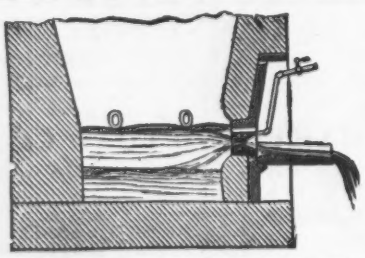

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